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By  
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BY

MAJOR F. WALL, I.M.S., C.M.Z.S.

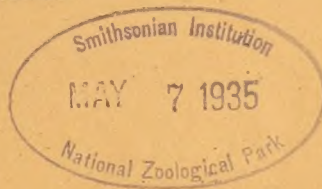
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A *Monograph of the Sea-Snakes* (Hydrophiinæ).

(With four plates).

By MAJOR F. WALL, I.M.S., C.M.Z.S.

More than ten years have now elapsed since the publication of Professor Boulenger's colossal work, *Catalogue of Snakes in the British Museum*, the third and last volume of which appeared in 1896. This last volume contains, among other matter, a detailed classification and description of the *Hydrophiinæ*, which remains the standard work on this admittedly difficult subject.

Within the last few years I have examined all the specimens of this sub-family contained in the following institutions: The Royal College of Surgeons, London; The Indian Museum, Calcutta; The Natural History Society, Bombay; The Government Museum, Colombo; The Medical College Museum, Madras; The Bangalore Museum; The City Hall Museum, Hongkong; The Shanghai Museum, and lately the entire British Museum collection. In addition I examined in Yokohama a large collection made by Mr. A. Owston in the seas about Japan and the Loo Choo Islands, a second large collection from the same source, a fine collection made by Mr. J. R. Henderson in Madras, and many smaller private collections from various parts as well as many specimens obtained by myself on the coasts of India and Burmah.

I have detailed notes of every specimen examined and propose in the following monograph to review this confused subject, which, I venture to think, requires a thorough revision; and this must necessarily entail much allusion to Professor Boulenger's work.

As collections become enriched it almost inevitably follows that with a larger series of specimens available, previous views require modification and correction. It is therefore not surprising that my views are in many ways substantially different from those held by Professor Boulenger a decade back. Since that authority's treatment of the subject the British Museum collection has acquired, as a matter of course, many additions, and the collections in many of the other institutions referred to above have grown, in most instances considerably, since any account of their contained material has been published. I am very decidedly of opinion that the actual number of species is much below that set forth in Professor Boulenger's work. This authority has already in his catalogue, in some instances, united under one heading many forms that had been previously considered distinct, and I think the generalisation commenced by him should be pushed very much further.

The conception of a species is of course, to a more or less extent, a matter of personal opinion. I shall therefore, in the following remarks, take every pains to set forth in detail the reasons in support of my views. But, beyond this, there are discrepancies between Mr. Boulenger's work and mine affecting questions of actual fact; I refer in particular to the supposed presence or absence of grooves in the posterior maxillary



teeth, a point of material importance in the present accepted classification. Where my observations differ from Mr. Boulenger's, I can only explain the discrepancy on the supposition that my vision may be keener than his, and the lens I worked with of higher power. Certain it is that grooves which were invisible under the lens I had previously used under the assurance that it was the strongest made, became clearly revealed by a new lens of the very highest power and quality specially recommended me for this work by Messrs. Baker, opticians, Holborn. More recently inspection with the aid of the microscope has confirmed my observations with this pocket lens.

Mr. Boulenger records the occurrence of solid posterior maxillary teeth in the genera *Hydrus*, *Acalyptus*, *Hydrelaps*, *Enhydrina*, *Platurus* and *Hydrophis* (in all of which, however, I can discern grooves). So far as the first five are concerned, this point does not influence his classification, but the genera *Hydrophis* and *Distira* are divided solely on the assumption that the small teeth are solid in *Hydrophis*, grooved in *Distira*. Now I find that in *Hydrophis* the small teeth are all grooved (not solid as Mr. Boulenger states), and being so, conform to the condition he claims to characterise the genus *Distira*. The error is one easy to understand, for many of his species of *Hydrophis* are snakes with very small constricted heads, and some of them, even when adult, are of notably small proportions. I could find no specimen for instance, of *H. gracilis* in the British Museum collection that enabled me to clear up this point, but in the Colombo Museum I saw three well-grown adults in which the grooves were plainly visible. In this connection I may point out that Mr. Boulenger in the "Fauna of British India Reptiles and Batrachia," published in 1892, says that the small maxillary teeth behind the fangs in the genera *Naia* and *Bungarus* are solid, but recognises and corrects these mistakes four years later in his Catalogue, Vol. III, pp. 373 and 365, where he rightly pronounces them grooved. This question of grooves has led to much confusion, for Mr. Boulenger has, in many cases, been led to describe as a new *Distira* a well-grown specimen of some previously known species of *Hydrophis*, the grooves well marked in the large adult snake having escaped detection in smaller or less perfect specimens. I have failed to discover a single species in the whole of the sub-family *Hydrophiinae* with the posterior maxillary teeth ungrooved.

Some remarks upon the external characters concerning classification are, I think, called for, and in dealing with these I shall refer to them in what I consider their order of relative importance beginning with the ventrals.

VENTRALS.—The presence or absence of these shields, and their development especially as regards breadth, are of the greatest importance in the separation of genera and species. They are absent in *Astrotia stokesi* being replaced by scales but little modified from those of the adjacent costal rows (see fig. 65 D). They are so ill-developed in the genus *Enhydris* that, except anteriorly in *E. curtus*, they might be better considered absent (see fig. 63). They are barely as broad as the last costal row in *Hydrus*, *Acalyptus* and *Thalassophis*. In *Hydrelaps*, *Enhydrina* and *Distira* they are rather less than twice the last costal row (see fig. 38). In *Distira viperina* they are unique, the anterior shields being three or four times as broad as the last costal row, the



rest of the series barely twice as broad (see fig. 57). In *Platurus*, *Emydocephalus*, and *Aipysurus* they attain their maximum development, being more than three times as broad in the whole body length and very similar to the same shields in Colubrine terrestrial snakes.

Numerically the value of these shields is of importance in distinguishing certain genera, but in closely allied species like those of the genus *Distira*, the range of variation in individuals is so considerable, and the figures of the specific ranges overlap so much, that the assistance to be derived from the number of these shields is decidedly limited. They are fewest in the genera *Emydocephalus*, *Aipysurus*, and *Hydrelaps*, being less than 200; most numerous in *Distira fasciata* where they may exceed 500.

The specific range of variation depends largely upon the numerical strength of the individuals available. If we exclude species but poorly represented numerically, the smallest range of variation is that met with in *Distira jerdoni* (219 to 248), and *D. viperina* (235 to 267); on the other hand the largest ranges of variation are seen in *Distira fasciata* (376 to 531), *D. torquata* (310 to 438), and *D. cyanocincta* (280 to 397).

The ventrals of most species are entire or mostly entire in the whole body length, the few shields that are divided being seen about the umbilical scar and before the anus. In *Hydrus platurus*, and in some specimens of *Distira major*, many of the shields are divided, but subject to a good deal of variation in number and position in individuals. In *D. cantoris* and *D. gracilis* all the shields in the posterior half or so of the body are very constantly divided (see fig. 13). In the very broad shields in some *Emydocephalus* and *Platurus* a median obtuse keel is seen posteriorly, but this is an inconstant feature found in only certain individuals, and, I believe, irrespective of age and sex.

The remarks made with reference to keels, tubercles, etc., under *costals* apply equally to these shields.

The ventrals in many of the species, specially in the genus *Distira*, are often very difficult to count accurately. The difficulty may arise from the detail of these shields being obscured by damage, desquamation, a local sodden condition, or the puckering in places occasioned by the way the specimen has been folded in the bottle. Often too small scales are interpolated on one or other side, which would alter the count on the two sides. Some observers count these, some do not. Again some appear not to count the shields which may be broken up, especially those just before the anus, and others again do not count the early ill-developed ones in the neck. The result is that the counts of various authors for the same specimen differ considerably. To take a single instance, the type-specimen of *Distira cyanocincta* has 308 ventrals according to Russell, 296 according to Boulenger, more than 320 according to Günther, and I count them 310. It is not very unusual for me to make these shields a little different in three or four counts in the same specimen, which may appear extraordinary for one to confess who strives at accuracy: still it is the fact.

**COSTALS.**—(The "scales" of other authors). The importance of these shields in classification is only second to that of the ventrals.



*Numbers.*—These may be the same or proximately the same (within 2) in the whole body length, or relatively more numerous posteriorly than anteriorly, and this is of great importance in separating genera. In *Platurus*, *Emydocephalus* and *Aipysurus* the rows are the same throughout, or vary but slightly. The same is a noticeable feature of *Distira jerdoni*, and one of my strongest reasons for believing that this species should occupy a place apart under a genus to itself. The degree to which the rows posteriorly may exceed those anteriorly in the same specimen varies considerably in different genera and species, but the range of variation to be met with in these two counts in individuals of the same species is such as to detract considerably from the assistance to be derived from this condition, especially in closely allied forms. In order to obtain the best results, I count these scales in three situations, *viz.*, anteriorly, *i.e.*, two headlengths behind the head, in mid body, and posteriorly, *i.e.*, two headlengths before the anus. The terms “anterior” and “posterior” used throughout this monograph are therefore precise. In *Distira spiralis* they may be from two to nine more posteriorly than anteriorly, in *D. fasciata* 10 to 22 more, and between these extremes every degree is to be met with in various other species.

The actual numbers of rows are very important in another way, assisting the distinction of genera and species. They are fewest in *Emydocephalus* (17 to 19), *Aipysurus* (except *lævis*) (17 to 19), and *Distira jerdoni* (19); most numerous in *Thalassophis annandalei* (90 to 100), *Enhydrina* (50 to 70), *Hydrus* (45 to 62), and *Astrotia* (48 to 59). In *Distira gracilis* they are very few anteriorly (17 to 21), and rather numerous posteriorly (27 to 35). Again the numbers of rows may be very constant in individuals of the same species, or the reverse, a condition influencing generic and specific classification. In *Platurus*, *Emydocephalus* and *Aipysurus*, individuals have a like number of rows, or range within two of the normal; on the other hand in certain species the rows counted at the same site vary in individuals very considerably, notably in *Enhydrina* from 50 to 70, *Hydrus* 45 to 62, *Distira fasciata* 37 to 51. Every degree of variation may be met with between these extremes.

*Imbrication.*—The costals may be imbricate, subimbricate, or juxtaposed, and this condition is of great importance generically, as well as assisting the separation of certain species in the genus *Distira*. In the genera *Platurus*, *Emydocephalus*, *Aipysurus* and *Astrotia* imbrication is pronounced in the whole body length, also in *Distira jerdoni*. In *Hydrus* and *Enhydris* the costals are juxtaposed throughout, and in certain species, notably *Distira cantoris* and *D. gracilis*, these scales are imbricate anteriorly, juxtaposed posteriorly. In certain species this condition is subject to variation, notably in *Distira fasciata*, *D. torquata*, *D. ornata*, *D. cærulescens*, etc., specimens being met with in which these scales are juxtaposed, and others in which they are distinctly imbricate or subimbricate posteriorly. This fact shows that, important as this condition is, it cannot be completely relied upon, and one is to expect a similar aberration in individuals of other allied forms.

*Size.*—This varies in the genera and in some species. The costals are comparatively large in the genera *Platurus*, *Emydocephalus* and *Aipysurus*, and in *Distira jerdoni*, but comparatively small in *Hydrus* and some *Distira*, notably *fasciata*, *cærules-*



*cens*, and *torquata*, and very small in *Thalassophis annandalei*. With rare exceptions the costals are of equal or sub-equal size in the whole body length. In the genus *Enhydris*, however, there is a notable enlargement of the three or four rows near the ventral median line. This point is not very well brought out in figure 63, which is intended to show the imperfect ventrals. In *Emydocephalus ijimæ* some vertebrales are much enlarged, but even in this species this is not a constant feature throughout the same individual, nor in different individuals.

*Shape*.—As a general rule the costals are rhomboidal when imbricate, more or less hexagonal where juxtaposed. The edges of the scales are peculiar in one species especially, *viz.*, *Astrotia stokesi*, where in the lowest rows they are irregularly dentate, and the apices emarginate (see fig. 66 D).

*Carination*.—In many genera the costals are quite smooth as in *Platurus*, *Emydocephalus* and *Aipysurus*, but in other genera they are furnished with short, median keels or tubercles to which many authors have attached considerable importance. Personally I do not share their views. Much attention to this character leads me to think little if any weight can be attached to it, either in the separation of genera or species. I find the degree to which these tubercles are developed varies very much in individuals from birth to maturity, and in individuals of the same species of similar growth. It is not unusual to see young specimens with these tubercles so little in evidence that the scales feel smooth, or almost smooth to the touch, and to meet with old examples which are very rough to the touch. Some authors are inclined to think the degree of development dependent upon the sexes, the males especially showing more pronounced tuberculation. In the case of *Enhydris curtus*, I have seen specimens in which the lowest and enlarged costal rows have the tubercles modified, so as to form spines resembling in size and shape the teats of some small mammals like the guinea-pig. Mr. Boulenger believes this occurs in males (Catalogue, Vol. iii, page 300), but my notes on this point are too imperfect to criticise this, or the belief entertained by others that males are more strongly tuberculate than others. In many species the scales are bi-, tri- or pluri-tuberculate or spinose, but I cannot see in this condition any means of assisting the classification of genera or species.

**HEAD SHIELDS.**—The actual presence in their entirety of many of these shields is of great importance in the separation of genera and species, but the relationship of these shields is of far less importance, and very secondary to most characters which affect the ventrals and costals. I find that the relationship of many of those shields which preserve the greatest degree of constancy in individuals, and which one must employ in the separation of species, is open to some variation in certain of these species, and it is therefore impossible to lay down hard-and-fast rules regarding head shields for distinguishing the various forms. A very open mind must be kept to prevent creating new species on insufficient grounds.

I find these shields in most, if not in all, species very prone to become rough and granular with age. In the young they are usually quite smooth, and often glossy, but in very old specimens the asperities are sometimes very pronounced. A good example



is to be seen in the type-specimen of *Hydrophis aspera* from Singapore now considered by Mr. Boulenger as *D. cyanocincta*, an opinion with which I am in accord. This specimen in this respect, as in all other important ones, is exactly like the large specimens labelled *grandis* in the British Museum, which I cannot separate from *cyanocincta*.

I cannot derive any help in distinguishing either species or genera from this condition, which appears to me one dependent largely upon age, possibly too upon sex.

ROSTRAL.—This is entire in all the genera except *Thalassophis*, where it is divided in one species. A partial, median vertical suture is seen sometimes as an aberrant feature in some species, especially in *Platurus schistorhynchus*.<sup>1</sup> In *Emydocephalus ijimæ* it may be furnished with a prominent, sharp spine directed forwards (see fig. 4), but this only occurs in certain individuals and has, I believe, no relation to sex.

The portion of this shield reflected backwards on the snout varies in some species, but the ranges of variation met with in individuals of the same species overlap so considerably that the point is of very limited importance. In *Distira cantoris* and *D. gracilis* the visible portion is from two-thirds to greater than the inter-nasal suture, and in two other slender-necked species, viz., *obscura* and *fasciata*, but little less. In nearly all other forms it is less than two-thirds, or even distinctly less than half.

The contact with surrounding shields is quite constant. In the genus *Platurus* and *Thalassophis*, owing to the presence of internasals, it touches five or six shields, five in *P. schistorhynchus*, six in the rest; but in all the other genera it touches four shields only. The sutures made with contiguous shields are peculiar in *Platurus*, the rostro-labial being the longest. In *Platurus laticaudatus* and *P. colubrinus* again the height exceeds the breadth of this shield, whereas in all the other species in the subfamily the reverse condition obtains; but the degree of breadth relative to height is subject to so much variation in individuals of many of the same species that I cannot utilise this feature in attempting to separate different forms.

In *Enhydrina* the lower margin of the shield is projected downwards to be received into the gap in the mental region, and this feature is peculiar to this snake only.

NASALS.—These are present in every species. Their position is of generic importance in *Platurus* only, owing to the presence in this genus of internasals. Here the nasals are lateral and separated, and the nostrils lateral; but in all other genera, except perhaps *Thalassophis*, the species have nasals in contact with one another on the snout behind the rostral, and the nostrils are superior. Where these shields are superior, sutures are frequently seen running from the nostril to adjacent shields. These are very inconstant in all the species, but there is a decided tendency for a suture to run outwards to the supralabials, backwards to the præfrontals, or inwards towards the opposite nasal. Sometimes three such sutures may radiate from the nostril, and in so doing split each nasal into three parts. The suture running outward is the one most constantly seen, and when present it almost invariably runs to the second supralabial. Exceptions

<sup>1</sup> A similar condition is seen in a specimen of *D. cærulescens* in the British Museum presented by Annandale and Robinson from the Malayan Region.



occur in *Enhydris hardwickii*, where it always runs to the first supralabial, and in rare examples of *Distira ornata* and *Enhydrina valakadyn* where it takes a similar course. The tendency for these shields to split is seen not infrequently in *Acalyptus peroni*, both *Thalassophis*, *Enhydris hardwickii*, *Enhydrina valakadyn*, *Distira nigrocincta*, *D. viperina* and *D. ornata*. (See figs. 40, 55 and 59). The condition is too inconstant to offer any help in classification.

INTERNASALS.—These shields are present in the genera *Platurus* only, where there are two, except in *P. schistorhynchus*. In this species there are two rows of shields, one anteriorly and usually two behind. (See fig. 1).

PRAEFRONTALS.—These are present in all the species and consist of a pair with a few exceptions, which occur in the genera *Platurus*, *Emydocephalus* and *Aipysurus* and *Thalassophis*. In *Platurus schistorhynchus* there are three, and in *Emydocephalus ijimæ* and in *Aipysurus* there may be four, but the condition in the two last is an inconstant one, the usual præfrontals seen in other forms being subdivided on one or both sides in some specimens only, so that the number of these shields does not aid classification. In *Thalassophis annandalei* there are many.

Normally in all the species the fellows of the pair are in contact, but in rare individuals of certain species the frontal is projected so far forward as to completely separate the fellows. I have seen this most frequently in *Distira viperina*, but also in *D. jerdoni* and some other species. It occurs in the type-specimen of Jan's *frontalis*, in a specimen in the British Museum referred by Mr. Boulenger to *frontalis* (Jan), but which I take to be *ornata* (Gray), and in the type-specimen of *brookii* (Günther). In the latter case the specimen is a gravid female, and the condition is not inherited by her unborn young (Boulenger Catalogue, vol. iii, p. 283). The relationship of the præfrontals with the supralabials is, I consider, of great importance. I find the relationship invariable in most genera, but in individuals of *Enhydrina* and *Astrotia* it is subject to some variation, and also in individuals of some species of *Distira*. In order to justify this assertion, I may remark that in some examples the relationship differs on the two sides, and it is usually very obvious when attention is paid to other characters which to consider the abnormal side. The unilateral abnormality naturally prepares one for the still rarer exception, in which the abnormality is bilateral. This remark applies with equal force to many other abnormalities alluded to as such in the headshields of individuals. In many genera these shields touch no supralabial, as for instance *Platurus*, *Aipysurus*, *Emydocephalus*, *Acalyptus*, *Thalassophis* and a few species of *Distira*, notably *jerdoni*, *nigrocincta* and *viperina*. In nearly all the other species the contact is with the second supralabial. In *Hydrelops darwiniensis* it touches the second and third, as it does also in some specimens of *Astrotia stokesi* and *Hydrus platurus*. In *Distira cantoris* it touches the third supralabial only (rarely the second also). The contact of this shield with the eye is unique in *Hydrelops darwiniensis*. (See fig. 8). I have, however, seen this as an aberrant feature in *D. obscura* owing to a confluence of the praeocular with the præfrontal. In one specimen it occurs on one side only, in another on both sides, and in one example of *D. jerdoni* on both sides. The



praefrontal is sometimes, too, divided externally so as to produce a pseudo-loreal. I have seen this in *Distira ornata* and some other species, but it is an obvious abnormality.

FRONTAL.—This is present in all species, and, with few exceptions, is normally entire. In *Aipysurus australis* and *Acalypus peroni* it is divided into fragments, the integral parts of which, however, taken collectively, clearly reveal the conformation of the shield as normally met with in other species.

It is occasionally divided by a partial or complete longitudinal suture, but the condition is an abnormal one. I have seen it in examples of *Hydrus platurus*, *Enhydris curtus*, *Distira cærulescens*, *D. cyanocincta*, and others (see figs. 34 and 42). The length of this shield relative to that of the supraoculars and parietals has a limited importance. In *Platurus colubrinus* it is much longer, and may even be twice as long as the supraocular. In most other species the lengths of each are subequal. In *Platurus schistorhynchus* it is longer than the parietals, but in all other species it is usually distinctly shorter. Its length compared with the length of the snout varies considerably in individuals of the same species, and the ranges of variation for the different species overlap so considerably that I cannot utilise the point in their separation, though Mr. Boulenger attaches much importance to it.

The breadth of the shield relative to that of the supraoculars, with few notable exceptions, is of no use in assisting the isolation of species. In all the species it is about as broad as or a little broader than the supraocular, but in *Distira viperina* the breadth is remarkable, amounting to more than twice and often thrice that of the supraoculars (see figs. 55 and 56); and in *Platurus colubrinus* and *P. laticaudatus* it is about twice that of the supraoculars. Of equally limited importance is the length of this shield relative to its breadth, which I find is about equal in *Distira viperina*. In other species the length is distinctly in excess of the breadth, but the relative proportions are so closely alike in all the species that the point offers no further help in isolating them.

Again the relative lengths of the sutures it makes with contiguous shields is practically the same in all the species, being subequal, or the fronto-praefrontals rather the shortest, and the fronto-parietals rather the longest. In the genus *Distira*, however, two species are peculiar. In *D. viperina* the fronto-supraoculars are the shortest and only about half the length of the fronto-parietals. In *D. nigrocincta* the fronto-praefrontals are shortest and only about half the length of the fronto-parietals.

SUPRAOCULARS.—These shields are present and entire in all forms excepting the genus *Aipysurus*. In *A. australis* and *A. lævis* they are divided.

PARIETALS.—These are present and normally entire in all species except *Aipysurus australis*, *A. lævis* and *Enhydris curtus*, but a tendency to division is very frequently seen in individuals of many other species, notably *Emydocephalus ijimæ* and *Thalassophis annandalei*. I have seen them divided in a specimen of *Distira cærulescens* in the Indian Museum (No. 13160), and the tendency to division is also seen in figures 34A, 45C, 60A and 66A. They are in contact with the postocular in all the species of the subfamily except *Distira cærulescens* normally, and in a few aberrant examples of *Hydrus platurus*.



PRÆOCULARS.—The absence of these shields is of generic importance in one instance, viz., *Hydreclaps darwiniensis* (see fig. 8); in all other forms they are present, but they do not assist the separation of either genera or species. In most of the species they are single, but I find in some species of *Distira* individuals occur with two where one is the rule, as in *viperina*, and similarly where two is the rule they are replaced sometimes by a single shield. In the latter case a notable example is *nigrocincta*. I have seen a confluence of the præocular and præfrontal in one example of *D. jerdoni* and two examples of *D. obscura*.

POSTOCULARS.—These are present in all the species, but are of no importance in classification. As will be seen under my remarks dealing with supralabials, authors are not agreed what to regard as postoculars, many applying this term to the upper part of a divided supralabial (usually the fifth); even when the term is restricted, as I propose, these shields are of no consequence, for in many of the species, specially of the genus *Distira*, one sees many individuals showing departures from the normal number.

SUPRALABIALS.—These are of generic importance in one notable instance, viz. *Emydocephalus*. In this genus the second shield is a remarkably long one, bordering the major length of the upper lip and also touching the eye (see fig. 4B). In all the other genera they number five or more, and the third is the first of the series to touch the eye; but the inconstancy in the number, disposition, and integrity of these shields in individuals of many species is such that a very little, if any, reliance can be placed on them in differentiating species. In *Distira jerdoni* there are six, the last of the series being confluent with a large anterior temporal shield (see fig. 58), but a similar confluence of the ultimate or penultimate supralabial with the anterior temporal is seen in individuals in *D. spiralis*, *D. fasciata*, *D. obscura*, etc. (see fig. 19B). In a few species such as *D. gracilis*, *D. cantoris*, *D. fasciata*, these shields are very constantly six, but in all the other species of *Distira*, in *Hydrus*, *Enhydrina*, *Enhydris* and *Astrotia* they vary very much in individuals, and especially the posterior shields in the series which are very prone to subdivision. I have seen the first subdivided in more than one example of *D. nigrocincta* including the type, and in one example of *D. cærulescens* (No. 13158 in the Indian Museum). It is divided, too, in Jan's specimen of *frontalis* (see fig. 34). The second is more frequently so distinguished as an abnormal condition, and the succeeding shields in the series become more and more prone to division. For a good example take *Distira cyanocincta*. In figure 28 from a typical specimen the third, fifth and sixth are divided. I do not think any one could reasonably doubt that this is the correct way of viewing these shields. In figure 29 taken from Jan, and acknowledged by Mr. Boulenger among others to represent the same species, the same three shields are seen entire on the right side, whilst the fourth and sixth are divided on the left side of the same specimen. I think it a mistake to record these shields in figure 28 as 8, with the fourth touching the eye, and in figure 29B, 8 with the third and fifth touching the eye. It appears to me obvious that in all three profile views the third, fourth and fifth touch the eye. In recording these shields in my



notes I use the following formula: In fig. 28, Lab. 8 ; 12 ( $\frac{3}{3}$  4  $\frac{5}{5}$ )  $\frac{6}{6}$ , the bracketted figures implying contact with the eye. To take another example of the tendency to variation in these shields see figure 66. Here these shields are 9, the anterior 7 entire, the fourth, fifth and sixth touching the eye. In figure 67B representing the same species, the third, fourth, fifth and sixth shields are divided, the upper portions of the fourth and fifth being confluent. I would use the formula 10, 12 ( $\frac{3}{3}$  ( $\frac{4}{4}$   $\frac{5}{5}$ )  $\frac{6}{6}$ ), and in so doing imply that three labials touch the eye, though in reality only two do so. It seems to me the only reasonable way of recording it. Unfortunately many herpetologists have taken a different view, and on the strength of their view created new species on grounds to my mind quite unjustifiable. To take a good case as illustration see figures 39 and 40. Mr. Boulenger presumably on the assumption that the posterior maxillary teeth in *nigrocincta* are not grooved (though this is a mistake) compared the specimen he subsequently described as *hendersoni* only with species he had tabulated as *Distira*, not heeding the many extremely close affinities this specimen bears to *nigrocincta*. In describing the specimen he calls the upper part of the divided second supralabial a loreal, the upper part of the third a præocular, and the upper parts of the fourth and fifth suboculars. He says that no labial touches the eye on the left side, and only the fourth on the right side. Now it appears to me obvious that the supralabials should be considered as follows on the left side : 8, 12 ( $\frac{3}{3}$ ,  $\frac{4}{4}$ ,  $\frac{5}{5}$ )  $\frac{6}{6}$ . On the right side in this specimen they are 8, 12 ( $\frac{3}{3}$ , 4  $\frac{5}{5}$ )  $\frac{6}{6}$ . On both sides three shields touch the eye. A comparison of these figures side by side with those of *P. cyanocincta* and *A. stokesi* shows how complete is the analogy. In the majority of species the third and fourth supralabials touch the eye with great constancy, though they may be divided or not; in many species, however, examples are to be found in which the fifth also finds contact. The result is that with the one or two exceptions first noted these shields do not assist classification in any way.

TEMPORALS.—These shields have been conceded, I consider, undue prominence in classification; for although it is true that a single large anterior shield is to be seen with great constancy in many of the species including many of the genus *Distira*, such as *gracilis*, *cantoris*, *fasciata*, *obscura*, etc., it is equally true that in many of the species of *Distira* especially, these shields present in many individuals departures from the normal. As in the case of *præoculars* and *postoculars*, the number of these shields depends, to a large extent, upon the tendency of the supralabials to subdivision, for many herpetologists regard as lower temporals what appear to me to be the upper parts of divided supralabials. I find, however, that even when these shields are viewed, as I regard them, they vary considerably in the individuals of many species, and their value has, I think, been overrated. There are some instances of an abnormal condition in these shields prompting the creation of a new species.

INFRALABIALS.—I regard as infralabials only those enlarged shields which are in contact with the sublinguals. They are distinctive and of generic value in one instance, *viz.*, *Emydocephalus*, where the second of the series is a very long shield bordering most of the lower lip (see fig. 4B); specifically their value is but limited. In



*Distira jerdoni* (fig. 58) there are three only, but in all the other forms four are present excepting *Aipysurus australis*, where they are too ill developed to deserve the name.

The first on each side meet behind the mental (except in a few abnormal individuals of a few species) and form a suture, the length of which compared with that between the anterior sublinguals has some importance. In *Distira cantoris*, *D. gracilis*, *D. obscura* and *D. fasciata*, etc., this suture is much longer than that between the anterior sublinguals, but in almost all the other species it is little longer and often shorter. The last infralabial is peculiar in *Aipysurus eydouxii*, *Acalyptus peroni*, *Platurus schistorhynchus*, *Distira cantoris*, *D. gracilis* and *D. jerdoni*, in that it touches but two scales behind. In all the other species it touches three or four.

MARGINALS.—I apply this term to certain small cuneate scales which are, in many species, intercalated between the infralabials at the labial margin. They are very distinctive in form, and not to be confused with divided infralabials, the outer parts of which are not cuneate in outline. Examples of divided infralabials are shown in figs. 12B where the third is divided on the left side, in 24C where the first is so distinguished on the left side, and in 59C where the fourth is divided on both sides.

Their constancy though apparently complete in many species is less so in others, thereby detracting somewhat from their value; still they are fully as important as many other characters upon which one has to rely in separating species, especially those of the genus *Distira*. They are absent in *D. gracilis*, *D. cantoris* and *D. jerdoni*, there being no exceptions in the large series of each that I have examined. Similarly, one or more are present in the large series of *viperina* (20), *cærulescens* (29), *fasciata* (34), *torquata* (29), without any exception. In most of the other species of *Distira* the constancy is not so complete though very striking. The constancy in the number of these little shields when present is not so striking, for though a very large number of individuals in many species have but one, and that wedged between the third and fourth infralabials, there is a tendency for more to be present and they may succeed the second infralabial. In *fasciata*, for instance, five specimens out of 38 have two marginals occurring after the second or third infralabials on one or both sides, in all the rest there is but one, and that after the third. The constancy in number and disposition though not complete is as striking in *obscura*, *cærulescens*, etc.

SUBLINGUALS.—The "Chin shields" of other authors. There are usually two pairs, the fellows of each in contact with one another. In *Astrotia* both pairs are absent. In *Hydrus*, *Enhydris* and *Enhydrina* they are poorly developed, especially the posterior, if they can be said to be present at all; and the anterior pair frequently present though small, has the fellows widely separated. In *Distira major*, *D. ornata* and *D. cærulescens* they may also be small, but the anterior pair is very generally present and the fellows in contact; the posterior, when recognisable, are usually well separated by small scales.

The contact or separation of the posterior pair when developed, though showing great constancy in some species, manifests frequent variation in individuals of other



species, so that this character is one not to be relied on. Its value and place is on a par with the contact of the præfrontal and supralabials, the condition of the anterior temporals and the arrangement of the marginals, and in no case should new species be based upon any of these characters singly, or even when combined, on the existence of a solitary example, unless there are other good grounds for doing so.

COLOUR AND MARKINGS.—These vary so in examples from birth to senility, and in many individuals of similar growth, in such well differentiated forms as, for instance, *Enhydrina valakadyn* and *Hydrus platurus*, about which there can be no confusion, that I cannot attach the slightest importance to them in classification. So far as the genus *Distira* is concerned, the species of which present the greatest difficulties in identification, it may be said, as a general rule, that they are marked with annuli in the young. These are usually well defined, complete and conspicuous, but tend to become less defined, partially or entirely obscured, or completely obliterated with age. It is noteworthy, too, that in many species where the head is completely black in the juvenile state, it loses its depth of hue with age, very frequently becomes mottled with lighter hues which show a great tendency to the formation of a horse-shoe, or crown-shaped mark, and this in turn may disappear as the whole head acquires a yellowish or light colour. These changes are very remarkable.

BODILY CONFIGURATION.—This in certain forms is very distinctive, but does not influence generic separation owing chiefly to the fact that the genus *Distira*, as at present understood, contains species exhibiting extremes in the relative proportions of their bodies, between which every degree of relative variation may be found; thus we see the extremely slender-necked forms of *cantoris*, *gracilis*, etc., associated with those of remarkably even girth throughout such as *jerdoni* and *spiralis*. I cannot but think that anatomical conditions will be revealed, which will enable the genus, as herein represented, to be split up into three or four genera at least.

In certain genera the bodies are cylindroid or feebly compressed throughout as *Platurus*, *Emydocephalus* and *Aipysurus*. In the others the posterior part of the body is moderately or extremely compressed. In certain *Distira* the anterior part of the body is cylindrical, the posterior very distinctly compressed, especially so in *cantoris*, *gracilis*, *fasciata*, *obscura* and *neglecta*. I find that the relative girths of the neck and body vary considerably from birth to adult life, in the sexes, and in the female from conception to parturition. In an example of *Distira obscura*, I have found the forebody considerably more than one-fourth the greatest body depth, and in another very distinctly less than one-fifth, and a very proximate range of variation is seen in other species. In many cases, however, the range given by me is likely to be considerably increased by measurements taken from heavily gravid females.

The difference in individuals in *obscura* is considerable, so much so that it is evident that in closely allied species corporeal habit cannot be relied upon to assist the isolation of species. Such terms as "small," "moderate" and "large" used by many herpetologists in application to calibre are, I need hardly say, far too indefinite. A further remark is necessary regarding the laxity that the tissues acquire in old age



in sea snakes in common with many other creatures. This laxity is to be seen especially in the bloated features, puffy lips, and about the chin shields of senile specimens which alters the approximation of the shields, obliterates their detail, destroys the clearness and definition of the head lines to such a purpose, that a dapper juvenile specimen of the same species appears a different creature. Figures 22 and 25 exemplify this statement. In case, however, my views with regard to these two forms being identical are not shared by others, I may say that I have seen as great a difference in general aspect between young and old specimens in such well differentiated species as *Enhydrina valakadyn*.

With the exception of the characters above made reference to I can find none which possess any weight at all in the separation of the species, and, as has been already remarked, many of those referred to are subject to some degree of inconstancy in certain species, making them at the best of somewhat uncertain value. Many of these very characters, however, cannot be dispensed with; they are essential to the separation of the species of *Distira*, but in making use of them one has to guard against allowing a single or dual aberration to form the basis of a new species as has undoubtedly so often been the case. Naturally it is the species that most lack definite characters that have suffered most separation and confusion, especially *Distira spiralis* and *cyanocincta*.

It is more than probable that many of my views expressed above may not be completely shared by other herpetologists, and I would remark that I believe that the only possible way to establish the constancy of the various shields in a given species is by a comparison of these in the gravid female with those of her unborn progeny. My opportunities for doing so have been limited, but in one species in particular I have been fortunate viz., *Enhydrina valakadyn*. I have had many gravid females, and examined the scale characters of each attentively with that of their contained foetus. The result was instructive, and modified my previous views considerably. The inconstancy of many shields relied upon by other authors implicitly in classification was found to be proximately similar in the few gravid females of other species, notably those of the genus *Distira*, which fortune has from time to time offered me for examination.

A series of gravid *Distira spiralis* and *D. cyanocincta* would alone, I feel assured, clear up the conception of these species as viewed by me in partial opposition to those held by other herpetologists. So far as the numbers of the costals and ventrals are concerned, I think it is reasonable to expect to find a proximate range of variation in individuals of species which are similar in corporeal habit. Now if one takes a well differentiated species such as *Enhydrina valakadyn*, which could not be confused with any other, the costals in the neck according to Mr. Boulenger's showing vary within twenty in individuals. A similar range is recorded by him for the body scales. The ventrals by the same authority's showing vary by 84. Now in some of the genus *Distira*, where a large series of specimens is available and these from the widest geographical area, a proximate degree of variation is seen in the costals, and even an excess in the range of the ventrals amounting to 155 in *fasciata*. Moderate



departures from the range hitherto recorded are to be expected as the series available becomes enriched in numbers, and especially when specimens are derived from a larger geographical area. It will be seen that my figures for both costals and ventrals in many species exceed those given in Mr. Boulenger's catalogue; at the same time they are well within the range given for certain other species even in *Distira spiralis* and *cyanocincta* into which I have tried to justify the absorption of many other forms previously considered distinct. It certainly appears significant that of 44 species recognised by Mr. Boulenger as distinct, and included by him in his genera *Hydrophis* and *Distira*, no less than 14 are known from the British Museum alone. It appears to me remarkable that none of these 14 are represented in the many continental and other museums, many of which have large collections of sea snakes. I am forced to think that other herpetologists have recognised the inconsistency of the characters used by Mr. Boulenger in classification, and in consequence have been deterred from describing new species on the uncertain basis offered by many of them.

#### KEY TO THE GENERA.

- A. Ventrals three or more times as broad as the last costal row in whole body-length.
- (a) Rostral touches 6 shields .. .. PLATURUS.
  - (b) „ „ 4 „
    - (a') Two or three supralabials, second very large .. EMYDOCEPHALUS
    - (b') Six or more supralabials .. AIPYSURUS.
- B. Ventrals nearly or more than twice the last costal row in midbody.
- (a) Præfrontal touching the eye, no mental furrow. Ventrals less than 200 HYDRELAPS.
  - (b) Præfrontal not touching the eye. Ventrals more than 200.
    - (a') A mental furrow .. .. ENHYDRINA.
    - (b') No mental furrow .. .. DISTIRA.
- C. Ventrals not as broad or little broader than last costal row.
- (a) Costals subimbricate. Præfrontal touches no labial. Frontal and parietals broken up .. .. ACALYPTUS.
  - (b) Costals juxtaposed. Præfrontal broken up, or if entire not touching second labial .. .. THALASSOPHIS.
  - (c) Costals juxtaposed. Præfrontal touches second labial.
    - (a') Lowest three or four costal rows enlarged. Ventrals less than 250 ENHYDRIS.
    - (b') Lowest costals not enlarged. Ventrals more than 350 .. HYDRUS.
- D. Ventrals absent. Replaced by imbricate scales like the costals .. ASTROTIA.



## SYNOPSIS OF GENERIC SHIELD CHARACTERS.

PRÆFRONTALS.				VENTRALS.				COSTALS.				GENUS.					
Rostral.	Internasals.	Number.	Contact with supralabials.	Touching eye.	Frontal.	Supraoculars.	Parietals.	Supralabials.	Marginals present.	Pairs of sublinguals.	Anterior.		Midbody.	Imbricate or juxtaposed in posterior body.	Vertebral enlarged.	Number.	Breadth compared with in midbody.
Entire	1 or 2	2 or 3	0	No	Entire	Entire	Entire	7 to 8	Yes or no.	1 or 2	19 to 25	19 to 25	Imbric	No	178—246	Thrice or more.	PLATURUS.
do.	0	2 to 4	0	do.	do.	do.	do.	3	No	2	15 to 17	17 to 19	do.	In one species	137—143	do.	EMYDO-CEPHALUS.
do.	0	2 to 4	0	do.	Entire or divided.	Entire or divided.	Entire or divided.	6 to 10	do.	2 or 0	17 to 25	17 to 25	do.	Yes or no.	137—166	do.	APIYSURUS.
do.	0	2	2nd and 3rd.	Yes	Entire	Entire	Entire	6	do.	2	27	27 to 28	do.	No	172—173	About twice.	HYDRELAPS.
do.	0	2	2nd (0)	No	do.	do.	do.	7 to 9	do.	Small hidden 1 or 2	40 to 60	50 to 70	Imbric or sub-imbric.	do.	230—314	Less than twice.	ENHYDRINA.
do.	0	2	2nd or 0	do.	do.	do.	do.	5 to 11	Yes or no.	2	17 to 48	17 to 54	Imbric or juxt.	do.	219—531	do.	DISTRA.
do.	0	2	0	do.	Divided	do.	Divided	7	Yes	2	19 to 23	24 to 29	Sub-imbric.	do.	156—209	Less than	ACALYPTUS.
Divided or entire	0*	4 or many	0	do.	Entire or divided.	do.	Sub-entire.	7 to 12	No	1 or 2	?	31 to 100	Juxt	do.	247—370	Small or Absent	THALASSOPHIS.
Entire	0	2	2nd (3rd)	do.	Entire	do.	Entire or divided.	7 to 8	Yes	2 or 0	29 to 36	27 to 45	do.	do.	130—219	do.	ENHYDRIS.
do.	0	2	2nd	do.	do.	do.	Entire	7 to 10	No	1 or 2 small.	40 to 54	45 to 62	do.	do.	378—440	Small	HYDRUS.
do.	0	2	2nd, 3rd or 0	do.	do.	do.	do.	7 to 9	Yes	2 or 0	41 to 48	48 to 59	Imbric	do.	Absent. Replaced by 230—267 costals.		ASTROTTA.

\* See remarks on these shields in description.







PLATURUS LATICAUDATUS (Linnæus).<sup>1</sup>

*Coluber laticaudatus*, Linn. *Mus. Ad. Fred.*, 1754, p. 31, pl. xvi, fig. 1.

*Platurus laticaudatus*, Boulgr. in *Blanford, Fauna Ind. Rept.*, 1890, p. 395 and fig. and Cat. iii, 1896, p. 307.

„ „ Sclater, *List Snakes Ind. Mus.*, 1891, p. 61.

„ „ Wall in *Proc. Zool. Soc. Lond.*, 1903, pp. 96 and 101.

„ *fischeri*, Günther, *Rept. Brit. Ind.* 1864, p. 356, pl. xxv, fig. A.

„ „ Jan, *Icon. Gén.*, 1872, livr. 40, pl. 1, fig. 2.

„ „ Fayrer, *Thanat. Ind.*, 1874, pl. xix.

„ *muelleri*, Boulgr., Cat. iii, 1896, p. 309.

? „ *affinis*, Anderson in *Proc. Zool. Soc. Lond.*, 1871, p. 190.

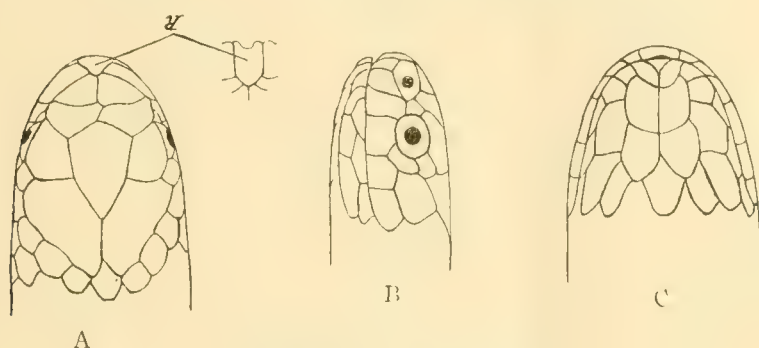


Fig. 2.—*Platurus laticaudatus* (nat. size).

*Description.* Rostral,—touches six shields, the rostro-labial suture is much the largest; portion visible above about one-fourth the internasal suture. Internasals,—a pair. Præfrontals,—two; not in contact with any supralabial. Frontal,—touches six shields; the fronto-parietal sutures largest. Supraoculars,—single; from  $\frac{1}{2}$  to  $\frac{3}{4}$  the length, and breadth of the frontal. Parietals,—entire. Nasals,—lateral; in contact with the first and second supralabials. Præoculars,—one. Postoculars,—two. Temporals,—one. Supralabials,—seven or eight; the third and fourth touching the eye (the fourth only in one specimen on one side). Infralabials,—the fifth is the largest of the series, and in contact with three scales behind. Marginals,—a complete row after the second or third infralabial usually (the first rarely). Sublinguals,—two pairs in contact with their fellows. Costals,—anteriorly 19, midbody 19; posteriorly 17; smooth; imbricate; the vertebrae are enlarged where the costals number 17. Ventrals,—210 to 246 three or more times as broad as the last costal row; with a more or less distinct lateral obtuse keel in the basal half of each shield; sometimes with an obtuse median keel posteriorly; the last shield sometimes divided. Anal,—divided. Colour,—alternately banded with dark brown, and yellowish, or greyish. The bands well defined, and the dark rather broader.

*Habitat.* Bay of Bengal, through the Malayan Region, China, Loo Choos, Philippines to New Guinea and Australia (Van Diemen's Land, Günther).

<sup>1</sup> I did not see the type-specimen said to be in the Indian Museum, Calcutta, nor does Sclater mention it in his List (1891, p. 61.) It may prove to be the specimen figured by Fayrer, pl. xix.



## PLATURUS COLUBRINUS (Schneider.)

*Hydrus colubrinus*, *Schneid.*, *Hist. Amph.*, 1799, i, p. 238.

? *Hydrophis colubrinus*, *Schlegel*, *Phys. Serp.* ii, 1837, p. 514, pl. xviii, figs. 21 and 22.

*Platurus colubrinus*, *Boulgr. in Blanford*, *Fauna Ind. Rept. and Batrach.*, 1890, p. 395 and *Cat.* iii, 1896, p. 308.

„ „ *Sclater*, *List Snakes Ind. Mus.*, 1891, p. 62.

„ „ *Wall in Proc. Zool. Soc. Lond.*, 1903, pp. 96 and 101.

„ *fasciatus*, *Jan*, *Icon. Gén.*, 1872, livr. 40, pl. i, fig. 1.

„ *scutatus*, *Günther*, *Rept. Brit. Ind.*, 1864, p. 356.

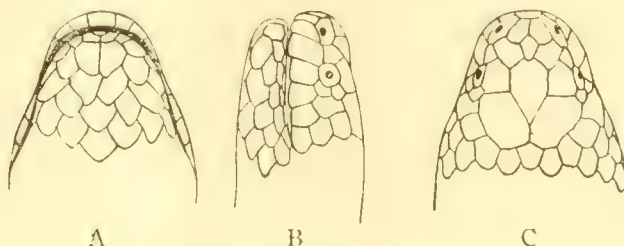


Fig. 3.—*Platurus colubrinus* (nat. size).

I have examined upwards of twenty of this species.

*Description*.—Rostral,—touches six shields; the rostro-labial sutures much the largest. Internasals,—a pair. Præfrontals,—three subequal shields in one transverse row; the outer touching no supralabial. Frontal,—entire; touches seven shields; the fronto-parietal sutures largest. Supraoculars,—half to about two-thirds as broad, and as long as the frontal. Parietals,—entire. Nasals,—lateral; in contact with the first three supralabials usually (sometimes only the first two). Præoculars,—one. Postoculars,—two. Temporals,—one (sometimes two). Supralabials,—seven; the third and fourth touching the eye. Infralabials,—the fourth is the largest of the series, and in contact with three or four scales behind. Marginals,—a complete row after the second infralabial. Sublinguals,—two well developed pairs, the fellows of each in contact. Costals, anteriorly 21 to 25, midbody 21 to 25, posteriorly usually 21 (rarely 23); imbricate; smooth. Ventrals,—195 to 240; three or more times as broad as the last costal row; the last one or two very frequently divided. Anal,—divided. Colour,—like the last, but in old specimens the bands are often effaced ventrally, and converted into dorsal bars.

*Habitat*.—From the Bay of Bengal through the Malayan Region, China, Philippines to Australia and New Zealand.

## EMYDOCEPHALUS.

Key to the species of *Emydocephalus*.

- |   |                    |
|---|--------------------|
| (A) Præfrontals 4; vertebrals much enlarged; costals smooth; a ventral keel posteriorly .. .. . | <i>ijimæ</i> .     |
| (B) Præfrontals 2; vertebrals not enlarged; costals tuberculate; no ventral keel .. .. .        | <i>annulatus</i> . |



## EMYDOCEPHALUS IJIMÆ (Stejneger).

*Emydocephalus ijimæ*, Stejneger in *Journ. Sci. Coll. Tokyo*, xiii, pt. 3, p. 223.

*Aipysurus annulatus*, Boulgr. Cat., vol. iii, 1896, p. 304, in part.

„ „ Wall in *Proc. Zool. Soc.*, 1903, pp. 95, 101; and 1905, ii, p. 517.

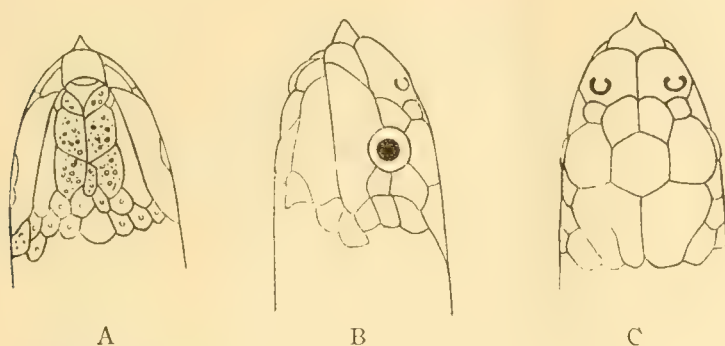


Fig. 4.—*Emydocephalus ijimæ* (nat. size).

In my paper referred to above which appeared in 1903, I alluded to this species under the title *Aipysurus annulatus*. I had not then seen Stejneger's description of this snake, but had formed the opinion that the specimens I saw in Mr. Owston's collection in Yokohama belonged to a species up to that time not described. Discussing the matter with Mr. Boulenger at the British Museum, I reluctantly suppressed my opinion in deference to the views held by so great an authority. Having now examined more specimens from the same locality and collector, and seen all the specimens in the British Museum labelled *Aipysurus annulatus*, I am more than ever convinced that under the latter title Mr. Boulenger includes two distinct species, viz., the *annulatus* of Krefft, and the *ijimæ* of Stejneger. The former has two præfrontals, little or no enlargement of the vertebral row, the scales rough with many tubercles and no ventral keel. The latter on the other hand has normally four præfrontals in a transverse series, very markedly enlarged vertexals, smooth scales, and an obtuse ventral keel.

In both the arrangement of the supralabials and infralabials is sufficiently distinctive to warrant their separation from *Aipysurus*, and their inclusion in a genus apart. I have examined nine examples all collected by Mr. Alan Owston around the Loo Choo Islands.

*Description.* Rostral,—touches four shields; with or without a sharp spine. Præfrontals,—normally four, but sometimes the pair on one or both sides is fused into one: in one example by this fusion there are but two, in two others there are three. The outer do not touch any supralabial. Frontal,—entire; in contact with six, seven or eight shields, depending upon the sub-division of the præfrontals; about three-fourths the length of the supraoculars. Parietals,—entire, usually partially split by a suture posteriorly. Nasals,—touch the first and second supralabials. Præoculars,—one. Postoculars,—two. Temporals,—two, small. Supralabi-



als,—two or three, the second very long, and touching the eye. Infralabials,—the second very long. Marginals,—none. Sublinguals,—two pairs, the posterior separated by one scale. Costals,—anteriorly 15 to 17, in midbody 17 to 19, posteriorly 15 to 17; smooth; the vertebrae enlarged and twice as broad as the next row of costals in the posterior part of the body, but in three specimens where the costals numbered 19 for a limited extent in the middle of the body the corresponding vertebrae were little if at all larger than the upper costal row. In these specimens the reduction of rows to the normal 17 was occasioned by the absorption of the uppermost costal row into the vertebral, and the great enlargement of this row was re-established. Ventrals,—137 to 143, broad as in land snakes, the posterior obtusely keeled in the median line; the last one or two sometimes divided. Anal,—divided (entire in one). Colour,—banded broadly with yellow, and blackish brown, the latter broader.

*Habitat*.—Loo Choo Islands, Formosa.

I append a synopsis of the specimens I have seen showing the shields which are subject to variation.

	Rostral with spine.	Præfrontals.	COSTALS.			Ventrals.	Last ventrals divided.	Anal.
			Anterior.	Midbody.	Posterior.			
1	Yes	1 R, 1 L	16	17	15	143	Last two	2
2	„	2 R, 2 L	17	17	17	141	„	2
3	No	2 R, 2 L	15	17	15	140	None	2
4	„	2 R, 1 L	16	17	17	138	„	2
5	Yes	2 R, 1 L	17	19	17	141	„	2
6	„	2 R, 2 L	17	19	15	142	„	2
7	No	2 R, 2 L	15	17	15	137	„	1
8	Yes	2 R, 2 L	?	17	?	138	„	2
9	„	2 R, 2 L	17	19	15	142	„	2

#### EMYDOCEPHALUS ANNULATUS (Krefft).

*Emydocephalus annulatus*, Krefft in *Proc. Zool. Soc. Lond.*, 1869, p. 322.

*Aipysurus annulatus*, Boulgr. *Cat.*, vol. iii, 1896, p. 304, in part.

Similar to the above, but differing in having but two præfrontals, little if any enlargement of the vertebral row, costals pluri-tuberculate and rough, and no ventral keel posteriorly.

*Habitat*.—Loyalty Islands.



## AIPYSURUS.

Key to the species of *Aipysurus*.

(A)	Costals in midbody	17	..	..	..	..	<i>eydouxii</i> .
(B)	Ditto	19	..	..	..	..	<i>australis</i> .
(C)	Ditto	21 to 25	..	..	..	..	<i>lævis</i> .

## AIPYSURUS EYDOUXII (Gray).

*Tomogaster eydouxii*, Gray, *Cat.*, 1849, p. 59.

*Aipysurus anguillæformis*, Günther, *Rept. Brit. Ind.*, 1864, p. 357.

„ *lævis*, Jan, *Icon. Gen.*, 1872, livr. 40, pl. ii, fig. 1.

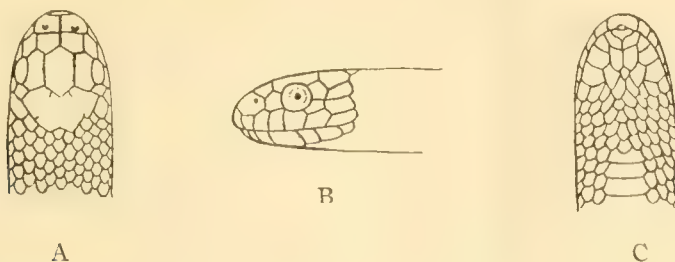


Fig. 5.—*Aipysurus eydouxii* (*lævis*). After Jan, *Icon. Gén.*, 1872, livr. 40, pl. ii, fig. 1.

I have examined six specimens.

*Description*.—Rostral,—touches four shields; the portion visible above about half the internasal suture. Præfrontals,—touch no supralabial, usually undivided, but sometimes divided longitudinally on one or both sides into two parts. Frontal,—touches six shields, all the sutures sub-equal; one-third to one-fourth longer than the supraoculars, longer than the parietals. Parietals,—entire; sometimes obliquely divided. Nasals,—in contact with the first and second supralabials. Præoculars,—one. Postoculars,—two. Temporals,—one or two. Supralabials, six, the sixth longest, the fourth only touching the eye (the third also in one specimen on the left side). Infralabials,—the fourth is the largest of the series, and touches two scales behind. Marginals,—absent. Sublinguals,—two pairs, the posterior quite separated by a scale. Costals,—smooth; anteriorly 17, midbody 17, posteriorly 15, (17 in one) the reduction from 17 to 15 takes place close to the site where I count the scales posteriorly and is effected by a fusion of the third and fourth rows above the ventrals. Ventrals,—138 to 142, three or more times as broad as the last costal row; obtusely keeled in the posterior part of the body. Colour,—yellow or yellowish, with dark brown dorsal bars ending in the flanks, or broken up into ventral spots.

*Habitat*.—Indian Ocean, Singapore, Java, Philippines.

## AIPYSURUS AUSTRALIS (Sauvage).

*Aipysurus australis*, Sauvage in *Bull. Soc. Philom.*, (7), i, 1877, p. 114.

„ *fuscus*, Günther, *Rept. Brit. Ind.*, 1864, p. 358.

(For a figure of this see fig. 6 on plate vii.)



I have examined three specimens only, all in the British Museum.

*Description.* Rostral, — touches four shields. Nasals, — touch the first and second supralabials (the first only in one specimen on the right side). Supralabials, — eight or nine, the anterior five or six are well developed, the rest divided; the fifth only touches the eye in one example. The other head, and chin shields are all broken up, and irregular. Costals, — anteriorly 19, midbody 19, posteriorly 17; the reduction from 19 to 17 is due to the fusion of the third and fourth rows above the ventrals; smooth or indistinctly keeled. Ventrals, — 156 to 166, three or more times as broad as the last costal row. Colour, — brown, or yellowish with irregular dorsal bars of brown spots.

*Habitat* — New Guinea, and Australia

#### AIPYSURUS LÆVIS (Lacépède).

*Aipysurus lævis*, Lacép. in *Ann. Mus.*, iv, 1804, pp. 197, 210 and pl. lvi, fig. 3

„ „ Günther, *Rept. Brit. Ind.*, 1864, p. 358.

*Hypotropis jukesii*, Gray in *Ann. and Mag. Nat. Hist.*, 1846, p. 284.

*Aipysurus fuliginosus*, Jan, *Icon. Gen*, 1872, livr. 40, pl. i, fig. 3.

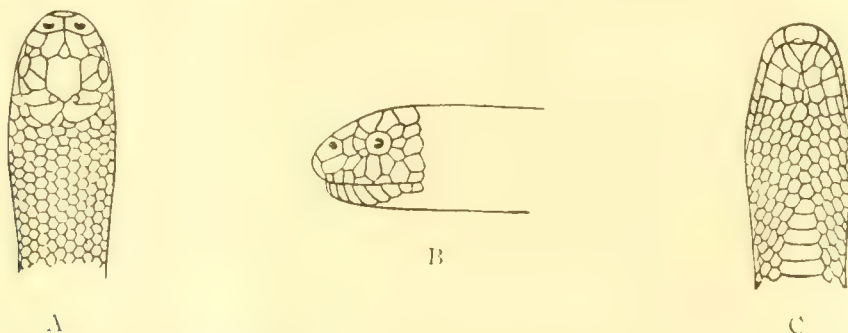


Fig. 7.—*Aipysurus lævis* (*fuliginosus*). After Jan, *Icon. Gén.*, 1872, livr. 40, pl. i, fig. 3.

I had insufficient time to bestow upon the specimens available in the British Museum, but the constancy of the scales in individuals of the species of this genus, and its closest allies (*Emydocephalus* and *Platurus*), is so remarkable that I think the range given by Boulenger, viz., 21 to 25, makes it likely that more than one form is embraced within his conception of the species. The only four specimens referred by Günther to this species had the costals in 21 rows. Under the circumstances I have no course other than to accept Mr. Boulenger's views.

*Description.* Rostral, — touches four shields, the portion visible above half, or less than half the internasal suture. Præfrontals, — very variable, sometimes a single row of four, sometimes a double row of three or four; the outer not in contact with any supralabial. Frontal, — entire or broken up. Supraoculars, — divided into two. Parietals, — broken up. Nasals, — touch no supralabial. Præocular, — one, two or three. Postoculars, — two or three. Temporals, three or four. Supralabials, — 7 to 10; very variable; some or all transversely divided; the fourth, fifth and sixth, or fifth and sixth, would touch the eye if not divided. Infralabials, — the fourth is the largest of the series, and in contact with three scales behind. Marginals, —



absent. Sublinguals,—two small pairs; both or the posterior only quite separated by scales. Costals,—anteriorly 21 to 25, midbody 21 to 25, posteriorly 19 to 21; smooth; the vertebrals may or may not be enlarged. Ventrals,—137 to 162. Three times or more than three times as broad as the last costal row; sometimes with a ventral obtuse keel posteriorly. Anal,—divided into two. Colour,—uniform dark brown.

*Habitat*.—Pacific Ocean from Celebes to the Loyalty Islands.

HYDRELAPS DARWINIENSIS (Boulenger).

*Hydrelaps darwiniensis*, *Boulgr. Cat. iii*, 1896, p. 270.

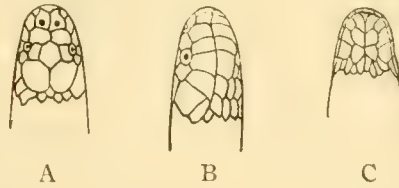


Fig. 8.—*Hydrelaps darwiniensis*. After Boulenger.

I have examined two examples only, both in the British Museum.

Rostral,—touches four shields; the portion visible above from one-third to one-fourth the internasal suture. Præfrontals,—touch the second and third supralabials and the eye. Frontal,—touches six shields; the fronto-parietal sutures twice or nearly twice the fronto-præfrontals. Supraoculars,—length and breadth about two-thirds that of the frontal. Parietals,—entire. Nasals,—touch the first and second supralabials. Præocular,—absent. Postoculars,—one. Temporals,—one. Supralabials,—6; the third and fourth touch the eye. Infralabials,—the fourth is the largest of the series, and touches three or four scales behind. Marginals,—absent. Sublinguals,—two well developed pairs, in contact with their respective fellows. Costals,—anteriorly 27, midbody 27 (28), posteriorly 25 (24); smooth, imbricate. Ventrals,—172 to 173; under three times as broad as the last costal row. Anal,—divided. Colour,—banded with 37 yellowish and black rings, the black rather broader than the yellowish dorsally, rather narrower ventrally. The posterior maxillary teeth are grooved.

*Habitat*.—Port Darwin.

ENHYDRINA VALAKADYN (Boie).

“Hoogli pattee” and “valakadyn,” *Russell, Ind. Serp.*, 1801, ii, pls. x & xi.

*Hydrus Valakadyn*, *Boie, Isis.*, 1827, p. 554.

*Hydrophis schistosa*, *Daudin, Rept.*, 1803, vii, p. 386.

„ „ *Schlegel, Phys. Serp.*, 1837, ii, p. 500, pl. xviii, figs. 1 to 3.

„ „ *Jan, Icon. Gén.* 1872, livr. 41, pl. ii, fig. 1.

„ *bengalensis*, *Gray in Zool. Misc.*, 1842, p. 62.

„ *fasciatus*, *Jan, loc. cit.*, livr. 41, pl. iii, fig. 2.

*Pelamis schistosus*, *Merrem, Tent.*, 1820, p. 139.

*Hydrus* „ *Cantor, Cat. Mal. Rept.*, 1847, p. 132.



*Enhydrina bengalensis*, Gray, *Cat.*, 1849, p. 48.

„ „ *Günther, Rept. Brit. Ind.*, 1864, p. 381.

„ „ *Fayrer, Thanat. Ind.*, 1874, pl. xviii.

„ „ *Nicholson, Ind. Snakes*, 1893, p. 118, pl. x, fig. 6.

„ *valakadyen*, Gray, *Cat.*, 1849, p. 48.

„ „ *Boulgr. in Blanford, Fauna Ind. Rept. and Batrach.* 1890, p. 406 and fig. ; and *Cat.*, iii, 1896, p. 302.

„ „ *Slater, List Snakes Ind. Mus.*, 1891, p. 64.

„ „ *Wall and Evans in Journ. Bomb. Nat. Hist. Soc.*, xiii, pp. 347 and 616.

„ „ *Wall in Journ. Bomb. Nat. Hist. Soc.*, xvi, p. 311, and in *Spol. Zeylan.*, Augt. 1907, p. 172.

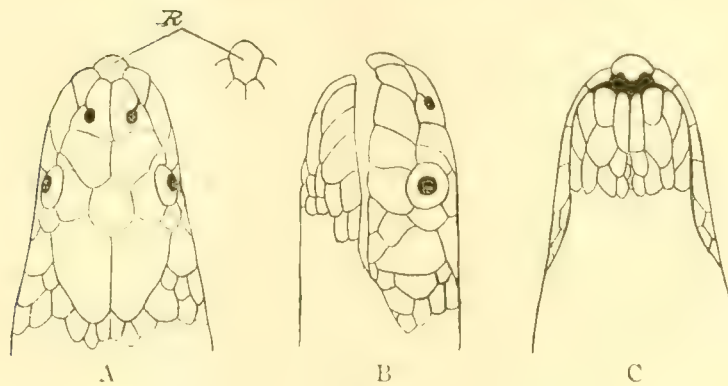


Fig. 9.—*Enhydrina valakadyen* (nat. size).

The type-specimen, which had previously been lost sight of, I discovered in the Royal College of Surgeons' Museum, London. It is No. 523 of their catalogue (1859, p. 78), and is the original specimen from Tranquebar figured by Russell in his second volume, plate xi. It was one of Russell's collection which was presented to the above Institution by the East India Company, most of which has since been transferred to the British Museum.

I do not concur with Boulenger in thinking plate x. of Russell's same volume a distinct species. I think there can be no doubt that this figure represents the same species as plate xi, viz. *valakadyen* (Boie), a view I may state taken by many other herpetologists. If this assumption is correct, and I cannot think otherwise, this species should rest under the title given it by Daudin in 1803, viz., *schistosa*, and Boie's *valakadyen* should be suppressed. I have examined a very large series of this species. In Cannanore on the Malabar Coast of India the fishermen brought them to me in bucketfuls, and I have frequently seen a dozen or more in a net at one haul on the Coromandel Coast (Gopalpore). It is a very easy snake to identify. The downward projection of the rostral and the groove in the symphysis menti are to be seen in no other sea snake.

*Description*.—Rostral,—touches four shields; the portion visible above is one-third or less than one-third the internasal suture. Præfrontals,—touch the second supralabial (except in rare examples where they fail to touch any).

**Frontal**,—touches six shields; the fronto-parietal sutures are longest, the fronto-præfrontal shortest. **Nasals**,—touch the first and second supralabials; sometimes two or more sutures radiate from the nostril and subdivide this shield, forming a pseudo-loreal or other pseudo shields. **Præoculars**,—one. **Postoculars**,—one or two. **Temporals**,—one, two or three superposed small shields. **Supralabials**,—irregular; the anterior two to five are well developed, the rest small, occasioned by horizontal sub-division, the extent to which this occurs affecting the contact with the eye, and the number of postoculars and temporals; the third and fourth usually touch the eye, sometimes the fifth also, more rarely the fourth only, or none at all touch the eye. **Infralabials**,—the fourth or fifth is the largest of the series, and in contact with three or four scales behind. **Marginals**,—absent. **Sublinguals**,—imperfectly developed, but an anterior pair at least can usually be discerned, the fellows of which are widely separated. **Costals**,—anteriorly 40 to 60, midbody, 50 to 70, posteriorly 50 to 70; sub-imbricate, or imbricate. **Ventrals**,—230 to 314, little larger, or not as large as the last costal row. **Colour**,—very variable. The young are bluish or bluish-grey with many well defined, black annuli, often dilated vertebally. As age advances these bands become more and more obscured, first disappearing ventrally, and so converted into dorsal bars, which in old specimens may disappear altogether. In old adults the dorsum is frequently a uniform bluish or bluish-grey, merging at midcosta to yellow or yellowish ventrally. Both dorsal and ventral hues again are subject to much modification according to whether the specimen has recently desquamated or is about to do so. In the latter case the yellow on the belly becomes often tinged with brown.

*Habitat*.—From the Persian Gulf, through the Indian and Malayan region to New Guinea.

The post maxillary teeth I find all grooved.

#### DISTIRA.

Having failed to discover a single species in which the posterior maxillary teeth are ungrooved, I have no course open to me but to unite the two genera *Hydrophis* and *Distira* (held by Mr. Boulenger to be distinct on this understanding); and as *Distira* is the older title, I retain this name to designate the genus.

I cannot but think, judging from external characters, that osteological differences will be discovered, to separate the slender-necked species from those of more even relative proportions, and I also expect to discover anatomical grounds for the isolation of *viperina* and *jerdoni* from the other species herein included in this genus. There seems to me sufficient justification for doing so on external characters alone; however, I prefer for the present to let them remain as placed by Mr. Boulenger.



KEY TO THE GENUS *Distira*.

- A. Ventrals present; anterior three to four times breadth of last costal row.  
(See fig. 57) .. .. . *viperina*.
- B. Ventrals present; anterior not more than twice breadth of last costal row.  
(See fig. 38).
- (a) Scales in midbody 19 to 21 .. .. . *jerdoni*.
- (b) Scales in midbody more than 21.
- (a<sup>1</sup>) Ventrals with median suture or furrow in posterior half of body.  
(See fig. 13).
- (a<sup>2</sup>) Præfrontal touches second supralabial, but not third.  
Anterior costals 17 to 21. Ventrals 225 to 298 .. *gracilis*.
- (b<sup>3</sup>) Præfrontal touches third supralabial (rarely second also).  
Anterior costals 21 to 25. Ventrals 377 to 474 .. *cantoris*.
- (b<sup>1</sup>) Ventrals unfurrowed; a few posterior irregularly divided, especially about umbilical scar.
- (a<sup>2</sup>) Posterior costals juxtaposed (except rare examples of *fasciata* and some *torquata*).
- (a<sup>3</sup>) One or more marginals.
- (b<sup>1</sup>) One large anterior temporal.
- (a<sup>5</sup>) Anterior costals 1 to 9 less than posterior .. *torquata*.
- (b<sup>1</sup>) Anterior costals 10 to 22 less than posterior *fasciata*.
- (b<sup>1</sup>) Two small superposed anterior temporals.
- (a<sup>5</sup>) Anterior costals 25 to 29 .. .. . *mamillaris*.
- (b<sup>5</sup>) Anterior costals 31 to 37; parietals touching postocular .. .. . *lapemoides*.
- (c<sup>5</sup>) Anterior costals 36 to 45; parietals not touching postocular .. .. . *cærulescens*.
- (b<sup>2</sup>) No marginals.
- (a<sup>1</sup>) Anterior costals 29 to 41 .. .. . *ornata*.
- (b<sup>1</sup>) Anterior costals 45 .. .. . *ocellata*.
- (b<sup>1</sup>) Posterior costals imbricate or sub-imbricate (except rare examples of *cærulescens* and some *torquata*).
- (a<sup>5</sup>) Anterior costals 19 to 23. Neck  $\frac{1}{4}$  to  $\frac{1}{5}$  greatest body depth .. .. . *obscura*.
- (b<sup>5</sup>) Anterior costals 23 or more. Neck  $\frac{1}{3}$  to  $\frac{2}{3}$  greatest body depth.
- (a<sup>1</sup>) Ventrals 250 or less .. .. . *major*.
- (b<sup>1</sup>) Ventrals 270 to 375.
- (a<sup>5</sup>) Costals in midbody 29 to 36. One large anterior temporal. Præfrontal touching 2nd labial .. .. . *spiralis*.
- (b<sup>1</sup>) Costals in midbody 33 to 44. Two superposed anterior temporals. Præfrontal touching 2nd labial .. .. . *cyanocincta*.

- (c<sup>5</sup>) Costals in midbody 36 to 43. Two superposed anterior temporals. Præfrontal touching no labial.. .. *nigrocincta*.
- (d<sup>5</sup>) Costals in midbody 37 to 54. One large anterior temporal. Præfrontal touching 2nd labial .. .. *torquata*.
- (e<sup>5</sup>) Costals in midbody 42 to 53. Two superposed anterior temporals. Præfrontal touching 2nd labial .. .. *cærulescens*.
- (f<sup>5</sup>) Costals in midbody 47. One large anterior temporal. Præfrontal touching no labial *bituberculata*.
- (c<sup>4</sup>) Ventrals 375 to 531.
- (a<sup>6</sup>) Anterior costals 25 to 36. Two superposed anterior temporals. Ventrals 375 to 397 *cyanocincta*.
- (b<sup>6</sup>) Anterior costals 25 to 41. One large anterior temporal.
- (a<sup>8</sup>) Anterior costals 1 to 9 less than posterior. Ventrals 376 to 438 .. *torquata*.
- (b<sup>6</sup>) Anterior costals 10 to 22 less than posterior. Ventrals 376 to 531 .. *fasciata*.
- (c<sup>6</sup>) Anterior costals 48 .. .. *neglecta*.



# SYNOPSIS OF SPECIFIC CHARACTERS IN THE GENUS *Distira*.

Rostral Part visible above compared with internasal suture	<i>Prefrontal</i> —Contact with supralabials	Relative length of sutures.	Supralabials—breadth compared with frontals	<i>Parietals</i> —In contact with postocular.	Frequency.	Number.	Supralabials.		Infralabials.	Mandibles.	Sublingual pairs.	Post-sublinguals in contact.	Costals.		Ventrals.		Number of examples			
							Number.	Touching eyes.					Scale touching the last.	Anterior.	Midbody.	Imbricate or juxtaposed.		Number.	Breadth of Ant. last costal row. compared with posterior half of body.	
1 to 2 (1st and 2nd) (also 3rd)	Parietals about $\frac{1}{2}$ to rest.	Yes.	Yes.	1	1	1	1	3rd and 4th.	4	2	None.	2	Yes	19 (17 to 21)	27 to 31	Juxt.	225 to 278 twice.	All	<i>gracilis</i>	32
1 to 2 (2nd and 3rd)	Parietals about $\frac{1}{2}$ to rest.	Do.	Do.	1, (2)	1	1	1	3rd and 4th.	4	2	Do.	2	Yes (No).	21 to 28	27 to 32	Do.	377 to 474	Do.	<i>cantoris</i>	2
1 to 2 (2nd and 3rd)	Parietals about $\frac{1}{2}$ to rest.	Do.	Do.	1	1	1	1	3rd and 4th.	4	3 or 4	1 after 3rd (2 after 2nd).	2	Yes (No).	19 to 28	25 to 32	Imb.	296 to 354	Do.	<i>obscura</i> or few.	1
1 to 2 (2nd and 3rd)	Parietals about $\frac{1}{2}$ to rest. or subequal.	Do.	Do.	1, (2)	1	1	1	3rd and 4th.	4	3 or 4	1 after 3rd (2 after 2nd or 3rd).	2	Yes (No).	25 to 38	37 to 50	Imb. or juxt.	376 to 531	Do.	<i>fasciata</i>	3
1 to 2 (2nd and 3rd)	Subequal.	Do.	Do.	1	1	1	1	3rd and 4th.	4	3	1 after 3rd	2	Yes	4	5	Imb.	More than 420	Do.	<i>neglecta</i>	1
1 to 2 (2nd and 3rd)	Parietals about $\frac{1}{2}$ to rest. $\frac{1}{2}$ > rest.	Do.	Do.	2	2	2	2	3rd and 4th.	4	3 or 4	1 after 3rd (2 after 2nd or 3rd).	2	Yes	25 to 30	31 to 40	Juxt.	287 to 367	Do.	<i>manillaris</i>	2
1 to 2 (2nd and 3rd)	Parietals about $\frac{1}{2}$ to rest. $\frac{1}{2}$ > rest. or subequal.	Do.	Do.	3	3	3	3	3rd, 4th, or 5th.	4	3 or 4	1 or more after 2nd or 3rd.	2	Yes (No).	25 to 31	30 to 37	Imb.	282 to 378	Do.	<i>spiralis</i>	2
1 to 2 (2nd and 3rd)	Parietals about $\frac{1}{2}$ to rest. $\frac{1}{2}$ > rest. or subequal.	Do.	Do.	2 (1)	2	2	2	3rd, 4th, or 5th.	4	3 or 4	All after 2nd or 3rd.	2	Yes (No).	25 to 30	33 to 44	Do.	280 to 397	Do.	<i>cyanocincta</i>	1
1 to 2 (2nd and 3rd)	Parietals twice $\frac{1}{2}$ to nearly twice prefrontals.	Do.	Do.	3 or 4	3 or 4	3 or 4	3 or 4	3rd, 4th, and 5th.	4	3 or 4	1 or more after 3rd.	2	No (Yes).	27 to 30	30 to 43	Do.	311 to 389	Do.	<i>nigrocincta</i>	2
1 to 2 (2nd and 3rd)	Parietals about $\frac{1}{2}$ to rest.	Do.	Do.	2 or 3	2 or 3	2 or 3	2 or 3	3rd and 4th.	4	3 or 4	All after 2nd or 3rd.	2	Yes (No).	31 to 37	40 to 49	Juxt.	300 to 387	Do.	<i>lapemoides</i>	9
1 to 2 (2nd and 3rd)	Subequal.	Do.	Do.	2	2	2	2	3rd and 4th.	4	3 or 4	1 after 3rd	2	Yes	28	47	Imb.	278	Do.	<i>bituberculata</i>	2

$\frac{1}{2}$ to $\frac{3}{4}$	2nd (o)	Parietals $\frac{1}{2}$ to $\frac{3}{4}$ > rest.	$\frac{2}{3}$ to =	Do.	1 (2 or 3)	1 (2)	7 to 8	3rd and 4th, or 3rd, 4th and 5th.	4	3 or 4	1 or 2 after 3rd (or after 2nd).	2	Yes No.	30 to 41	37 to 54	Do. or juxt.	310 to 438	Do.	<i>torquata</i>	..	29
$\frac{1}{2}$ or less.	2nd	Parietals $\frac{1}{2}$ to $\frac{3}{4}$ > rest.	$\frac{2}{3}$ to =	No (Yes.)	1 or 2	2 (3)	6 to 8	3rd, 4th (and 5th).	4	3 or 4	1 after 3rd	Small or none.	No (Yes).	36 to 45	42 to 53	Imb. or juxt.	277 to 339	Do.	<i>caerulescens</i>	..	29
$\frac{1}{2}$ to $\frac{3}{4}$	2nd (o)	Parietals $\frac{1}{2}$ to $\frac{3}{4}$ > rest.	$\frac{2}{3}$ to =	Yes.	2 or 3	2 or 3 (1)	7 to 8	3rd, 4th (and 5th or 6th).	4	3 or 4	None (1 after 3rd).	2 (1)	Yes (No).	29 to 41	33 to 46	Juxt.	227 to 300	Do.	<i>ornata</i>	..	36
rather more than $\frac{1}{2}$ or less.	2nd	Parietals $\frac{1}{2}$ to $\frac{3}{4}$ > rest.	$\frac{2}{3}$ to =	Do.	2	2	6	3rd and 4th.	5	2	None	2	No	45	58	Do.	290	Do.	<i>ocellata</i>	..	1
	2nd	Parietals $\frac{1}{2}$ to $\frac{3}{4}$ > rest. or subequal.	$\frac{2}{3}$ to =	Do.	2 (1)	2	8 (9)	3rd and 4th.	4	3 or 4	All after 3rd	2	No	31 to 35	33 to 42	Imb.	233 to 250	Do.	<i>major</i>	..	5
$\frac{1}{2}$ to $\frac{3}{4}$	o	Parietals twice or thrice supraoculars, latter small-est.	$\frac{1}{2}$ to $\frac{3}{4}$	Do.	2 (1)	2 or 3 (1)	7 to 9	3rd and 4th, or 3rd and 4th and 5th.	4	3 or 4	1 or 2 after 3rd.	2	Yes or No.	27 to 34	39 to 50	Juxt.	235 to 267	Four or more times.	<i>viperina</i>	..	21
$\frac{1}{2}$ to =	o (2nd)	Parietals rather longest or all subequal.	$\frac{2}{3}$ to $\frac{3}{4}$	Do.	1 (2)	1	6	3rd and 4th.	3	2	None	2 small or absent.	Yes	17 (16 to 18)	19 to 21	Imb.	219 to 248	About twice.	<i>ferdoni</i>	.	17

N. B.—Bracketted figures imply rare exceptions.

\* It is possible that in many more of the species individuals occur with the 5th touching the eye, as well as the 3rd and 4th, as many of my earlier notes recorded the unbroken shields only in this connection.



## DISTIRA GRACILIS (Shaw).

"Tatta pam," *Russell, Ind. Serp.*, 1801, i, pl. xlv(?) and vol. ii, pl. xiii.

*Hydrus gracilis*, *Shaw, Zool.*, 1802, iii, p. 560.

*Anguis mamillaris*, *Daudin, Rept.*, 1803, vii, p. 340.

*Microcephalophis gracilis*, *Gray, Cat.*, 1849, p. 46.

*Liopala gracilis*, *Gray in Zool. Misc.*, 1842, p. 60.

? *Hydrophis gracilis*, *Schlegel, Phys. Serp.*, 1837, pl. xviii, figs. 6 and 7.

" " *Günther, Rept. Brit. Ind.*, 1864, p. 373.

? " " *Murray, Vert. Zool. Sind*, 1884, p. 395.

" " *Boulgr. in Blanford, Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 404, and fig., p. 398.

" " *Sclater, List Snakes Ind. Mus.*, 1891, p. 64.

" " *Wall in Mem. As. Soc. Bengal*, 1906, p. 283, and in *Spol. Zeylan.*, Augt. 1907, p. 167.

? " *microcephala*, *Jan, Icon. Gén.*, 1872, 41, pl. v, fig. 2.

? " *guentheri*, *Murray, loc. cit.*, p. 396, and plate (non Theobald).

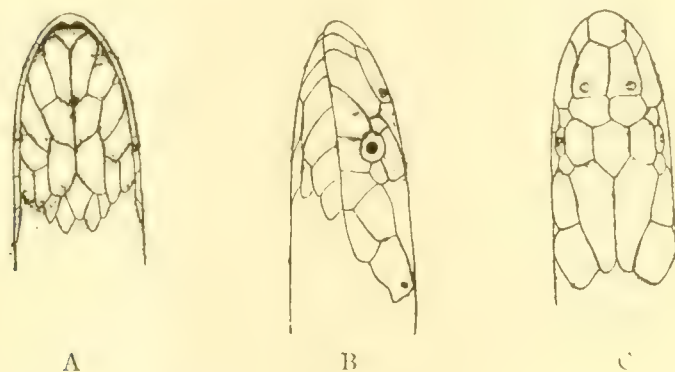


Fig. 10.—*Distira gracilis* ( $\times 4$ ).

I have examined 32 of this common, and very well differentiated species.

I do not concur with Mr. Boulenger's view concerning plate xlv in Russell's first volume, which I think clearly represents this species. Mr. Boulenger seeks to make this the type of his *mamillaris* (see Catalogue, vol. iii, p. 277). I only know two species, in which the portion of the rostral visible above ever equals the length of the internasal suture as shown in this plate, viz., *gracilis* (Shaw), and *cantoris* (Günther). It seems probable that the large anterior and posterior temporal shields shown in the same plate are single though this point is not quite certain. The relative proportions of depth in the neck and body are not apparent owing to the dorsal aspect of the snake being shown *in toto*. The breadth, and number of the bands, their vertebral dilation, and the juxtaposed character of the scales mentioned in the letterpress, are as typical of *gracilis* (Shaw) as *mamillaris* (Boulenger), but the condition of the rostral and the anterior temporal, followed by a larger posterior shield, are so typical of *gracilis* (Shaw) that I cannot escape the conviction that it is this snake which is represented.

Again, I do not share Mr. Boulenger's opinion with regard to the snake figured by Schlegel (*Phys. Serp.*, 1837, plate xviii, figs. 6 and 7) which he considers *fasciata* (Schneider). The specimen is so faithfully depicted that one can count 21 rows of scales in the neck (*fasciata* has 25 to 31). It appears to me to agree perfectly with *gracilis* (Shaw).

I find the posterior maxillary teeth in this species grooved in at least three well-grown specimens.

*gracilis* (Shaw) shares with *cantoris* (Günther), a combination of characters which occurs in these two species alone amongst *Distiræ*. The portion of the rostral visible above is nearly equal to or even exceeds the length of the internasal suture; the fourth infralabial touches two scales only behind, and the ventrals in the major part of the posterior half of the body are grooved or divided in the median line, so that each is represented by a pair of pentagons with apposed bases. The commissure of the mouth seen in profile resembles the italic letter *f*. (Not well shown in figure 10). Some of these characters are suggested or approached in others of the very slender-necked species, viz., *obscura* (Daudin), *fasciata* (Schneid.) and *neglecta* (Wall), but the ventrals are quite peculiar to *gracilis* and *cantoris*.

*Description*.—Body anteriorly three-tenths to one-fourth the greatest depth. The last measurement was from a gravid female.

The head shields show great constancy.

Rostral,—the portion visible above, three-fourths to greater than the internasal suture. Præfrontals,—touch the second supralabial (five exceptions on one or both sides). Postoculars,—one. Temporals,—one large anterior succeeded by another even larger shield, the anterior touching the fifth and sixth supralabials. Supralabials,—6, not subject to division. Infralabials,—4, the last touching two scales only behind; the suture between the first longer than that between the anterior sublinguals. Marginals,—none. Sublinguals,—two pairs, the fellows of each in contact. Costals,—anterior 19 (17 in two, 18 in three, and 21 in one), midbody 27 to 31, posterior 27 to 35; the anterior imbricate, the posterior juxtaposed. Ventrals,—225 to 298; entire anteriorly and about twice the breadth of the last costal, row divided or furrowed in the median line in the posterior half of the body. Colour,—in the young the head is quite black. The body is surrounded with from 42 to 61 annuli, usually dilated, and often more or less confluent vertebrally, and ventrally especially in the forebody. With age the rings may lose definition, or become much obscured especially ventrally, and the head often assumes a much lighter hue.

*Habitat*.—All the specimens I have examined were procured from shores between the Persian Gulf and Mergui on the Tenasserim Coast.

#### DISTIRA CANTORIS (Günther).

*Liopala fasciata*, Gray in *Zool. Misc.*, 1842, p. 60.

*Hydrophis fasciata*, Gray, *Cat.*, 1849, p. 50, spec. C.

„ *cantoris*, Günther, *Rept. Brit. Ind.*, 1864, p. 374, pl. xxv, fig. V.



*Hydrophis cantoris*, Boulgr. in *Blanford, Fauna Ind. Rept. and Batrach.*, 1890, p. 405.

„ „ *Sclater, List Snakes Ind. Mus.*, 1891, p. 64. (Except No. 8232).

„ „ *Boulgr. Cat. Brit. Mus.*, 1896, iii, p. 281, and pl. xiv.

„ „ *Wall in Mem. As. Soc. Bengal*, 1906, p. 284.

„ *fasciatus*, *Sclater, loc. cit.*, p. 63, No. 8258.

*Distira gillespiæ*, Boulgr. in *Journ. Bomb. Nat. Hist. Soc.*, xii, p. 642, and plate.

„ „ *Wall in Journ. Bomb. Nat. Hist. Soc.*, xv, p. 723 and fig.

„ „ *Wall, loc. cit.*, xvi, p. 311.

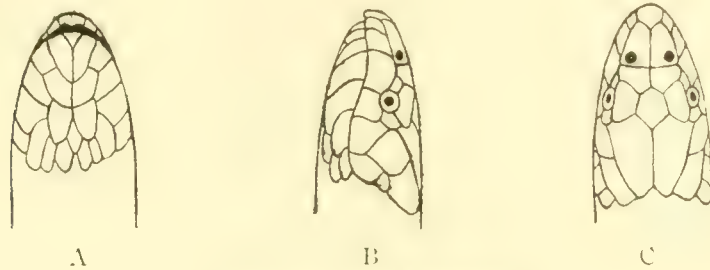


Fig. 11.—*Distira cantoris*.

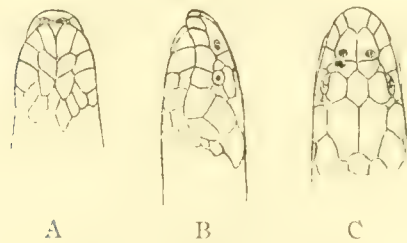


Fig. 12.—*Distira gillespiæ*. After Boulenger.

This species is poorly represented in the British Museum, where there are but five examples. These, however, include the type obtained by Cantor in Penang. I have examined in all 22 specimens exclusive of the type of Mr. Boulenger's *Distira gillespiæ*<sup>1</sup> which I consider identical.

*Distira gillespiæ* (Boulenger).—This is known from a single large specimen from Karachi. Mr. Boulenger finding grooves in the post-maxillary teeth, placed it with his genus *Distira*, and made it a new species. I find, however, that typical specimens of *cantoris* have grooves in these teeth contrary to Mr. Boulenger's belief, and in the enormous specimen of *cantoris* presented by Rogers to the British Museum since the publication of Mr. Boulenger's catalogue, they can be seen with the naked eye. *Cantoris* is an extremely well differentiated member of the family, and marked off from all the other species of this genus by one feature peculiar to itself, *viz.*, the contact of the præfrontal with the third labial. Added to this it presents a combination of characters which it shares with *gracilis* alone, *viz.*, the shape of the commissure of the mouth, the great length of the rostral, the contact of only two scales behind the fourth infralabial, and the peculiar divided condition of the posterior ventrals. All of these

<sup>1</sup> *Journ. Bomb. Nat. Hist. Soc.*, vol. xii, p. 642.

characters, besides many other unusual ones found in *cantoris*, are all found in *gillespiei*. The slight and only differences apparent in Mr. Boulenger's descriptions of the two, concerning the body scales, and the ventrals disappear within the range my 19 specimens cover.

*Description*.—The body anteriorly is about one-third to one-fourth the greatest body depth. The snout projects well over the chin, and the commissure of the mouth resembles an italic *f* in profile.

The headshields are very constant.

Rostral,—the portion visible above is from three-fourths to greater than the internasal suture. Præfrontals,—touch the third supralabial (the second also rarely). Postoculars,—one (two rarely). Temporals,—one large anterior, succeeded by another even larger posterior shield, the anterior touching the fifth and sixth supralabials. Supralabials,—6, not subject to division. Infralabials,—4, the last in contact with only two scales behind; the suture between the first as long or longer than the suture between the anterior sublinguals. Marginals,—none. Sublinguals,—two well developed pairs, the fellows of each in contact (separated in one specimen). Costals,—anterior 21 to 25 (21 in one only), midbody 27 to 37, posterior 39 to 46; the anterior imbricate, posterior juxtaposed. Ventrals 377 to 474, entire anteriorly and twice or nearly twice the breadth of the last costal row, divided by a median furrow in the posterior half of the body.

Colour,—yellowish ventrally, olivaceous dorsally. Surrounded by 51 to 61 black rings in the young which become obscured ventrally, and converted into bars, these in turn becoming more and more obscured as age advances. Head black in young, fading later. The bands much confluent ventrally anteriorly and usually expanded vertebrally. All the specimens are from the Indian shores (Karachi to the Gangetic Delta), except Cantor's specimen which is from Penang. A specimen in the Indian Museum (No. 8260) measures 6 feet 1 inch.

#### DISTIRA OBSCURA (Daudin).

"Shootur sun," and "Kalla shootur sun," *Russell, Ind. Serp.*, 1801, ii, figs. vii and viii.

*Hydrophis obscurus*, *Daud., Rept.*, 1803, vii, p. 375

„ *chloris*, *Daud., loc. cit.*, p. 377, pl. xc.

? *Pelamis obscurus*, *Merrem., Tent.*, 1820, p. 139.

? „ *chloris*, *Merrem., loc. cit.*

*Hydrophis coronata*, *Günther, Rept. Brit. Ind.*, 1864, p. 372, pl. xxv, M, and M'.

? „ „ *Anderson in Proc. Zool. Soc. Lond.*, 1871, p. 192.

? „ „ *Fayrer, Thanatoph. Ind.*, 1874, pl. xxvi.

„ „ *Boulgr. in Blanford, Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 402.

„ „ *Boulgr. Cat. Brit. Mus.*, 1896, iii, p. 279.

„ „ *Sclater, List Snakes Ind. Mus.*, 1891, p. 63.

„ „ *Wall in Mem. As. Soc. Bengal*, 1906, i., p. 282.



? *Hydrophis latifasciatus*, Günther, *loc. cit.*, p. 372, pl. xxv, fig. T.

„ „ „ Blanford in *Journ. As. Soc. Bengal*, 1879, p. 132.

„ „ „ Boulgr. in Blanford, *Fauna Brit. Ind. Rept. and Batrach.*,  
1890, p. 401.

„ „ „ Boulgr. *Cat.*, 1896, iii, p. 279, and pl. xiii.

„ „ „ Sclater, *loc. cit.*, 1891, p. 63.

„ „ „ Wall, *loc. cit.*, 1906, p. 281.

(For figure 13 see plate vii.)

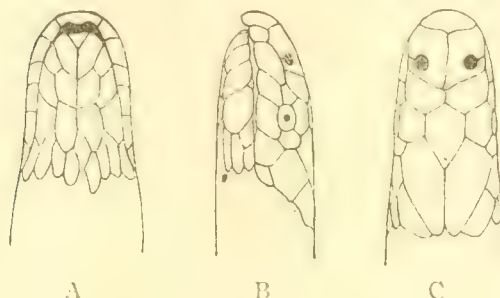


Fig. 14. — *Distira obscura*, × 3.

Mr. Boulenger is without doubt in error in his consideration of this species.<sup>1</sup> Daudin's *obscurus* is based upon two specimens figured by Russell,<sup>2</sup> the originals of which are in the British Museum. Daudin gave to one (plate vii) the name *obscurus*, and to the other (plate viii) the title *chloris*. Both these snakes being now recognised by Mr. Boulenger as identical, an opinion with which I am in accord, they are united under the former title, *i.e.*, *obscura*. Under *obscura*, however, Mr. Boulenger describes a totally different snake, which is obviously the *torquata* of Günther! One point alone will suffice here in support of this statement, *viz.*, the neck scales in *obscura* as described by Mr. Boulenger are from 33 to 40, whereas in Russell's type-specimens just alluded to they are 21! This snake the true *obscura* of Daudin he describes under the name *H. coronata* (Günther).<sup>3</sup>

The following description is based upon 15 examples including those labelled *coronata* and *latifasciata* in the British Museum, which there is no doubt are the same. Two of these are Russell's types, six are in the Indian Museum (five of these from the Gangetic Delta), two are specimens of mine from Burma, and two others in the Bombay Natural History Society's collection from Karwar on the coast near Bombay.

*H. latifasciata* (Günther). The descriptions of this, and *coronata* (Günther) given in Mr. Boulenger's catalogue are almost identical. The only differences are that in *coronata* the temporal is stated to descend to the labial border whereas this is not specified in *latifasciata*. The post-chin shields are in contact in *coronata*, separated in *latifasciata*. I find on examining these specimens that the temporal descends to the labial border on the right side in the type-specimen of *latifasciata*, a species only known from a solitary specimen; and in two specimens of *coronata* in other collections,

<sup>1</sup> *Cat.*, vol. iii, p. 284.

<sup>2</sup> *Ind. Serp.*, vol. ii, 1801, plates vii and viii.

<sup>3</sup> *Loc. cit.*, p. 279.

I find the post-chin shields separated. I can find no point of difference therefore between the two species.

Daudin's name *obscura* has preference over both *coronata* and *latifasciata*, and must therefore be retained to denote this species. It is an extremely well-marked form, that should never be confused with any others up to now described. The scales in the neck alone (19 to 23) mark it off from all the other species of *Distira* excepting *gracilis*, which it resembles in some ways, especially in bodily conformation, the relative proportions of neck and body, and in the head shields generally, but it is very definitely a species apart, owing to the imbrication of the costals posteriorly, the greater number of ventrals, the presence of marginals and the much greater length to which it attains.

*Description*.—The body anteriorly varies from more than one-fourth to less than one-fifth the greatest body depth. I find the posterior maxillary teeth grooved, in specimens labelled *coronata* in the British Museum and my own specimens (and in the type-specimen of *latifasciata*). The head shields as in the other slender-necked species are mostly very constant, but certain shields, notably the anterior temporal and the posterior sublinguals, are less so than in *gracilis* and *cantoris*.

Rostral,—the portion visible above is from half to three-fifths the internasal suture. Præfrontals,—touch the second supralabial. Postoculars,—one. Temporals,—one large anterior succeeded by another as large or larger. Supralabials,—six; the fifth and sixth usually separated by the descent between them of the anterior temporal; they are not subject to division. Infralabials,—four, the last in contact with three or four scales behind, the suture between the first as long or longer than the suture between the anterior sublinguals. Marginals,—one after the third infralabial usually, sometimes two after the second (absent on one side in two examples). Sublinguals,—two well developed pairs, the fellows of each in contact. (In two examples the posterior fellows are separated). Costals,—anterior 19 to 23, midbody 25 to 32, distinctly imbricate everywhere. Ventrals, 296 to 354, entire throughout, and twice or nearly twice the breadth of the last costal row throughout. Colour,—much like the last two. The head is uniformly black in the young, and the body surrounded by from 34 to 60 broad annuli which are dilated, and often more or less confluent vertebrally, and ventrally especially in the forebody and neck. With age the colour of the head may change, and become bluish or olivaceous blue, and acquire or retain a yellow spot or horse-shoe mark on the crown. The bands become less defined with age especially posteriorly.

*Habitat*.—Shores between Karwar on the Coromandel Coast of India and Mergui on the Tenasserim Coast. Theobald's specimens have no habitat recorded, but are probably from the Burmese Coast. My figures are from a specimen of mine from Burma in which the scales are 21 to 22 anteriorly, 29 in midbody, and 31 posteriorly; imbricate everywhere. The ventrals are 318. The neck is one-fifth the greatest body depth.

#### *DISTIRA FASCIATA* (Schneider).

? *Hydrophis gracilis*, Jan, *Icon. Gén.*, 1872, 41, pl. iv, fig. 2.

„ *chloris*, Günther, part, *Rept. Brit. Ind.*, 1864, p. 370 (non Daudin).



*Hydrophis atriceps*, Günther, *loc. cit.*, p. 371, pl. xxv, fig. i.

*Aturia lindsayi*, Gray in *Zool. Misc.*, 1842, p. 61.

*Hydrophis lindsayi*, Gray, *Cat.*, 1849, p. 50.

„ „ „ „ Günther, *loc. cit.*, p. 371.

? „ „ *fasciatus*, Peters in *Mon. Berl. Ac.*, 1872, p. 849, pl. 1, fig. 1.

„ „ „ „ Boulgr. in *Blanford, Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 404.

„ „ „ „ Sclater, *List Snakes, Ind. Mus.*, 1891, p. 63. Nos. 8257, 8259, 8261, 8264, 8265, 13393.

„ „ „ „ Boulgr., *Cat. Brit. Mus.*, 1896, iii, p. 281.

„ „ „ „ Wall in *Mem. As. Soc. Bengal*, 1906, p. 285.

„ „ *melanocinctus*, Wall, *loc. cit.*, p. 287.

„ „ *cantoris*, Sclater, *loc. cit.*, p. 64, No. 8232.

„ „ *leptodira*, Cantor in *Trans. Zool. Soc. Lond.*, 1840, p. 311, pl. lvi.

„ „ *brookii*, Günther in *Proc. Zool. Soc. Lond.*, 1872, p. 597 and fig.

*Distira rhombifer*, Boulgr. in *Ann. and Mag. Nat. Hist.* 1900, p. 306.

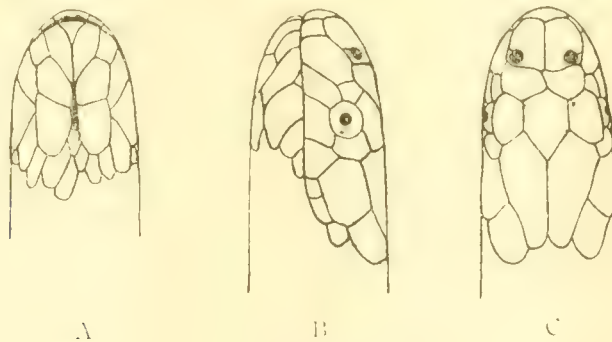


Fig. 15.—*Distira fasciata*.

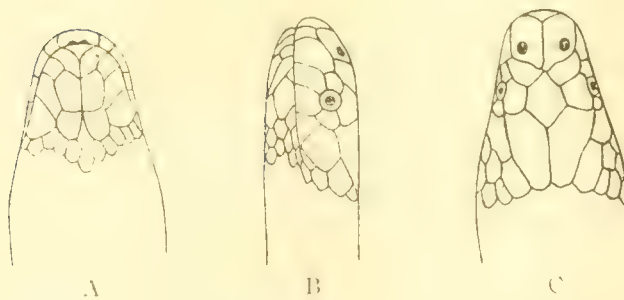


Fig. 16.—*Hydrophis brookii*. After Günther, *Proc. Zool. Soc.*, 1872, p. 597.

I have examined 38 examples of this snake including the four species *leptodira* (Cantor), *brookii* (Günther), *rhombifer* (Boulenger), and *melanocincta* (Wall), all of which I consider the same. It is very well differentiated, as much so as any of the preceding.

In bodily configuration, general appearance, colour, and markings it is exactly like *gracilis*, a fact which has led to the confusion of the two, though there are many, and considerable differences between them.

*H. leptodira* is known from a single specimen, described by Cantor,<sup>1</sup> and now in the British Museum. The description given by Mr. Boulenger exactly accords with that given by him of *fasciata* (Schneider), except that *leptodira* has 58 scales round the body. That authority counts the scales differently from me, taking them round the extreme body girth. I count them in three definite situations as already stated in my prefatory remarks under "costals." The scales in these three places number 30, 50 and 47, and the snake accords perfectly in this, as in all other respects, with typical examples of *fasciata*. In three other specimens I find them 50 in midbody, and in three 49.

*H. brookii* (Günther).<sup>2</sup>—I have examined the only known specimen which is in the British Museum. The description of this specimen in Mr. Boulenger's catalogue<sup>3</sup> compared with that of *fasciata* shows one solitary difference, *viz.*, in the length of the frontal which in *brookii* equals its distance to the end of the snout, but in *fasciata* equals its distance to the rostral only. I find, however, that in many specimens of *fasciata* the frontal equals its distance to the end of the snout. Even if it did not, so extremely slender a distinction occurring in a solitary individual should deter one from ranking it as a species. I think I am nearly accurate if I say that probably no individual is found of any species exactly in accord with the type, and if one were to create species on differences as slender as has here been the case, almost every individual would have equal claim to such rank. I have examined the type with many specimens of *fasciata*, and can find nothing to separate them.

*Distira rhombifer*.—A single example only of this is known, described by Mr. Boulenger<sup>4</sup> from a specimen now in the British Museum. He remarks upon its close affinities to *fasciata*, and separates it on the broader rostral, larger number of body scales (55) and the colour. The first distinction affecting the rostral is a very minute one, and affects a shield which in breadth is subject to much variation in individuals of the same species. I find other specimens which I consider *fasciata* where it is relatively quite as broad. The scales in this specimen I count 32, 49 to 51, and 45 in anterior, mid, and posterior body. It thus accords perfectly with other specimens of *fasciata* in the British Museum. As regards colour there are at least four other examples of *fasciata* in the British Museum exactly similar, *i.e.*, with rhombs dorsally instead of complete rings. I see no difference between this and *fasciata*.

*H. melanocinctus*.—Last year I described as a new snake<sup>5</sup> what I considered at the time a very definite species, but which now I must regard as a somewhat aberrant *fasciata*. I took my original view because the specimen had only 25 rows of scales anteriorly, the præfrontal failed to touch the second supralabial, and the scales were imbricate posteriorly. Though the anterior scales are unusually low, I find a specimen of *fasciata* in the British Museum with 26, *viz.*, the type of Günther's *atriceps*, I find the præfrontal does not touch the second labial in four other specimens I have seen, and the scales I observe are imbricate posteriorly, contrary to the rule,

<sup>1</sup> Trans. Zool. Soc. Lond., 1840, p. 311, and plate lvi.

<sup>3</sup> III, 1896, p. 282.

<sup>2</sup> Proc. Zool. Soc. Lond., 1872, p. 597.

<sup>4</sup> Ann. Mag. Nat. Hist., 1900, p. 306.

<sup>5</sup> Memoirs, As. Soc. Bengal, 1906, p. 287.



in certain specimens of *fasciata* in the British Museum. In all other respects this specimen agrees with typical *fasciata*, and should, I feel certain now, be considered as such.

*Description*.—*Fasciata* like the three preceding, has an extremely slender neck in relation to its body, and is almost as regular in the arrangement of its headshields. The neck is from one-third to one-fourth the extreme body depth.

The posterior maxillary teeth are grooved.

*R o s t r a l*,—The portion visible above is from half to three-fifths the length of the internasal suture. *P r æ f r o n t a l s*,—touch the second supralabial (except in five examples where they fail to, and in four of these on both sides). *P o s t o c u l a r s*,—one (in one example two) *T e m p o r a l s*,—one large anterior succeeded by a posterior of equal or greater size. The anterior in five examples descends to the labial margin. (In two specimens only the posterior are broken up, and in both on one side only.) *S u p r a l a b i a l s*,—six or seven; not subject to division. *I n f r a l a b i a l s*,—four; the last in contact with three or four scales behind; the suture between the first as long or longer than that between the anterior sublinguals. *M a r g i n a l s*,—present, usually one only after the third infralabial, sometimes two after the second or third. *S u b l i n g u a l s*,—two well developed pairs, the fellows of each in contact (in three examples at least the posterior are quite separated by a scale). *C o s t a l s*,—anterior 25 to 33 (usually 29 to 31), midbody 37 to 51 (usually 41 to 47); posterior 37 to 51 (usually 41 to 47); the anterior imbricate, the posterior usually juxtaposed (rarely imbricate). *V e n t r a l s*,—376 to 531, entire, twice or nearly twice the breadth of the last costal row. *C o l o u r*,—exactly like the last two in young specimens. The annuli vary from 48 to 71, are well defined and about as broad at midcosta as the interspaces. They are often expanded vertebally and tend to lose their definition in old specimens, sometimes indeed they are entirely lost ventrally, and the dorsum is then marked with black or blackish diamond marks.

*Habitat*.—All the specimens have been obtained along the shores between Malabar and China, one from Borneo, and two others from the Malay Archipelago, the exact locality not specified (Bleeker's specimens in the British Museum). It appears to be common on the Coromandel Coast of India specially. One solitary specimen has been recorded from the Malabar Coast, the exact spot not specified.

#### DISTIRA NEGLECTA (Wall).

*Hydrophis obscurus*, *Sclater*, *List Snakes Ind. Mus.*, 1891, p. 63, No. 8598.

„ *neglectus*, *Wall in Mem. As. Soc. Bengal*, 1906, p. 288.

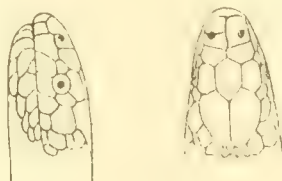


Fig. 17.—*Distira neglecta*.

Known from a single very young specimen in the Indian Museum, described by me.

It presents very definite characters which demarcate it very clearly from other species. These are notably the scales in the neck and body which are 48 and 54 respectively. These numbers only accord with *cærulescens* and *ocellata*. The number of the ventrals (over 420) and imbricate character of the scales posteriorly are sufficient to exclude both *cærulescens* and *ocellata*. In general appearance it is extremely like *fasciata*.

*Description*.—The portion visible above is about half the suture between the nasals. Præfrontals,—touch the second labial. Postoculars,—one. Temporals,—one anterior on the right side, two on the left. Supralabials,—seven, none divided. Infralabials,—four, the fourth largest and in contact with three scales behind; the suture between the first pair subequal to that between the anterior sublinguals. Marginals,—one after the third infralabial. Sublinguals,—two well developed pairs, the fellows of each in contact. Costals,—anterior 48? <sup>1</sup> midbody 54? <sup>1</sup> posterior 45; imbricate everywhere. Ventrals,—exceed 420 (probably are 15 to 30 more, but the neck is rent), entire and about twice the breadth of the last costal row everywhere. Colour,—head and neck black; body with 59 well defined annuli not confluent ventrally except in front, about as broad as the interspaces at midcosta.

*Habitat*.—Rangoon.

#### DISTIRA MAMILLARIS (Boulenger, nec Daudin).

*Hydrophis fasciata*, Günther, *Rept. Brit. Ind.*, 1864, p. 374, pl. xxv, fig. Q and Q'.

„ *mamillaris* Boulgr. in *Blanford, Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 401, and *Cat.*, 1896, iii, p. 277.

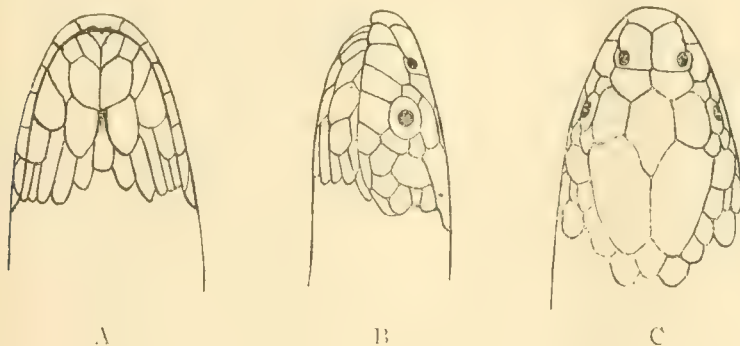


Fig. 18.—*Distira mamillaris*,  $\times 2$ .

The name *mamillaris* originated with Daudin, who applied it to the original of plate xlv of Russell's first volume. This plate, I consider, represents without doubt the *gracilis* of Shaw as already mentioned under that species, so that the form now under discussion has no right to this designation.

The type-specimen of the form referred to by Mr. Boulenger as *mamillaris* is, I

<sup>1</sup> The specimen is sodden, and the scales difficult to count with certainty.



consider, undoubtedly Beddome's specimen in the British Museum, which was figured by Günther<sup>1</sup> and referred by him to *fasciata* (Schneider). I agree with Mr. Boulenger in considering this specimen distinct from *fasciata*, but I do not agree with him in associating it with Russell's plate xlv. Whether or not this form should rank as a definite species, or be considered a *lapemoides* or a variety of *cyanocincta*, it is difficult to say.

I have seen six specimens which are so alike in scale characters and colour that I feel sure they are identical. Two of these are the specimens labelled *mamillaris* in the British Museum, one in the College of Surgeons' Museum (No. 521C); one in the Indian Museum, Calcutta (No. 13392); and two in the Bombay Natural History Society's collection. The range of variation in the anterior costals is 25 to 29, in the costals at midbody 31 to 40. The ventrals range between 287 and 367. The annuli vary from 43 to 56, are well defined, and broader than the spaces; and in all other particulars including postoculars, temporals and labials they are alike.

The sole character I can find to differentiate these from *lapemoides* is that the costals are fewer. From *cyanocincta* they are characterised only by the juxtaposed condition of the costals.

*Description*.—The forebody is from one-third to one-fourth the greatest body depth. The head shields are almost as regular as in the preceding species of *Distira*.

Rostral,—the portion visible above from half to three-fifths the internasal suture. Præfrontals,—touch the second supralabial. Postoculars,—two. Temporals,—ill developed and irregular, usually two superimposed scales anteriorly (in one specimen three on one side, and a single large shield on the other). Supralabials,—seven, the posterior three or four subject to division. Infralabials,—four, the last in contact with three or four scales behind. The suture between the first shorter than that between the anterior sublinguals. Marginals,—present; usually one after the third infralabial, sometimes two after the second or third (in one example none on one side, one after the third on the other). Sublinguals,—two well developed pairs, the fellows of each in contact. Costals,—anterior 25 to 29, midbody 31 to 40, posterior 34 to 41; the anterior imbricate, posterior juxtaposed. Ventrals,—287 to 367, entire, twice or nearly twice the breadth of the last costal row throughout. Colour,—head black, body surrounded by from 43 to 56 well defined black annuli, which are much broader than the interspaces at midcosta, and usually much confluent ventrally, especially anteriorly.

*Habitat*.—The shores of Peninsular India. Apparently rare. My figure is from a specimen in the Bombay Society's collection from Bombay.

#### DISTIRA SPIRALIS (Shaw).

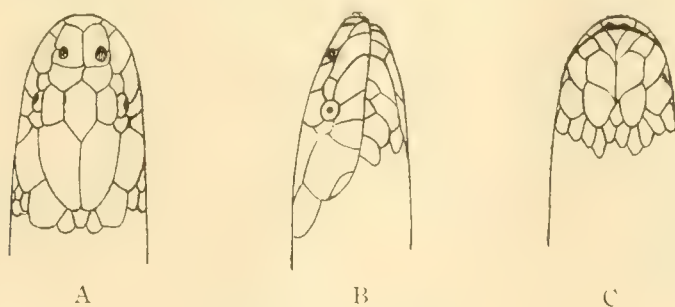
*Hydrus spiralis*, Shaw, *Zool.* iii., 1802, p. 564, pl. cxxv.

*Hydrophis spiralis*, Gray, *Cat.*, 1859, p. 54.

„ „ Günther, *Rept. Brit. Ind.*, 1864, p. 366, pl. xxv, fig. D.

<sup>1</sup> *Rept. Brit. Ind.*, pl. xxv, figs. Q and Q'.

- Hydrophis spiralis*, Boulgr. in *Blanford, Fauna Ind. Rept. and Batrach.*, 1890, p. 401; and *Cat. Brit. Mus.*, 1896, iii, p. 273.  
 „ „ *Wall and Evans in Journ. Bomb. Nat. Hist. Soc.*, xiii, p. 348;  
*Wall in Spol. Zeylan.*, Augt., 1907, p. 166.  
 ? „ *nigrocinctus*, Jan, *Icon. Gén.* 1872, 41, pl. ii, fig. 2.  
 „ *robusta*, Günther, *loc. cit.*, p. 364, in part.  
 „ „ *Fayrer, Thanat. Ind.*, 1874, pl. xxi.  
*Distira robusta*, Boulgr. in *Blanford, Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 409.  
 „ „ *Sclater, List Snakes Ind. Mus.*, 1891, p. 65.  
 „ „ *Wall and Evans in Journ. Bomb. Nat. Hist. Soc.*, xiii, p. 615.  
 „ „ *Wall in Mem. As. Soc. Bengal*, 1906, p. 290.  
 ? *Hydrophis rappii*, Jan, *loc. cit.*, 41, pl. iv, fig. 1.  
 ? „ *temporalis*, *Blanford in Proc. Zool. Soc. Lond.*, 1881, p. 680, and fig.  
 ? „ *bishopii*, Murray, *Vert. Zool. Sind*, 1884, p. 391, and pl.  
 „ *subcinctus*, Gray in *Zool. Misc.*, 1842, p. 63; and *Cat.*, 1849, p. 52.  
 „ „ *Günther, loc. cit.*, p. 368, pl. xxv, fig. F.  
 „ *melanocephalus*, Gray, *Cat.*, 1849, p. 53, in part.  
 „ „ *Boulgr., Cat. Brit. Mus.*, iii, p. 283, and pl. xv.  
 „ *melanosoma*, *Günther, loc. cit.*, p. 367, pl. xxv, fig. E.  
*Distira melanosoma*, Boulgr., *Cat.*, 1896, iii, p. 291.  
 „ *brugmansii*, Boulgr., *Cat.*, 1896, iii, p. 292.  
 „ „ *Wall in Proc. Zool. Soc. Lond.*, 1903, p. 96; and in *Spol. Zeylan.*, August, 1907, p. 169.  
*Hydrophis alcocki*, *Wall in Mem. As. Soc. Bengal*, 1906, p. 288, pl. xv, fig. 3.  
 „ *floweri*, Boulgr. in *Proc. Zool. Soc. Lond.*, 1898, p. 106, and plate.  
 „ *longiceps*, *Günther, loc. cit.*, p. 375, pl. xxv, fig. O.  
*Chitulia fasciata*, Gray, *Cat.*, 1829, p. 56.

Fig. 19.—*Distira spiralis*.

Under this title I include six species considered distinct by Mr. Boulenger, viz., *brugmansii* (Boie), *subcinctus* (Gray), *melanocephalus* (Gray), *melanosoma* (Günther), *wrayi* (Boulenger), *floweri* (Boulenger), and one described by myself, *alcocki* (Wall), all divided I consider, on insufficient grounds, affecting shields known to be subject to variation in this and other allied species.

*spiralis*.—There are in the British Museum only five specimens labelled *spiralis*,



all of which appeared to me to be the young of the species labelled in the British Museum *brugmansii* (Boie). Upon examining the posterior maxillary teeth I could discern grooves in them. The one important difference between the two supposed species judging from the descriptions of the two in Mr. Boulenger's Catalogue was therefore abolished. The other apparent differences affect the supralabials and the ventrals. Though Mr. Boulenger's description of *spiralis* gives the supralabials as "six or seven," in all the specimens so labelled in the British Museum they are seven except in one specimen on one side only where they are six. It is to be noted, too, that in four of the twelve specimens labelled *brugmansii* in the same institution, there are six supralabials on one or both sides and seven in the rest. As regards ventrals the same authority gives the range for *spiralis* 270 to 334, that for *brugmansii* 300 to 354. The overlapping is great, and the available species meagre in the case of *spiralis* and not very numerous in the case of *brugmansii*. I would point out that four of the five specimens of *spiralis* are so alike in size and general appearance as to leave one with the conviction that they are hatchlings of the same brood, an idea supported by the fact that they are all preserved in the same bottle, and presented by the same donor. A careful examination of the available specimens of the two supposed species side by side strengthened my conviction, for I failed to discover any difference between them. The slight difference apparent in the number of ventrals entirely disappears within the range given me by the large series of specimens I have examined.

The vertebral spots which occur between the annuli by no means form a complete series in some of the specimens of *spiralis*; and it is to be specially remarked that a very good series of these spots occurs in Beddome's specimen labelled *brugmansii* from Malabar, and there is at least one pronounced vertebral spot in one of Henderson's specimens. I think the most that can be conceded to the two forms is the rank of colour varieties retaining for the species the name *spiralis* which has precedence. My figure (19) is from a specimen of mine from Pegu now in the Bombay Society's collection referred to by Evans and me as *Distira robusta* in the Bombay Journal, Vol. xiii, p. 615. The scales in the neck are 27, midbody 34, posteriorly 34. The ventrals are 320.

*brugmansii* (Boie).—Of the twelve specimens so named in the British Museum, only nine appear to me to be identical, and should, I think, be included under the older specific title *spiralis* with the five small specimens already so described by Mr. Boulenger. This species I propose, for the present, to consider distinct as above constituted, but it is so extremely closely allied to the forms *cyanocincta* (Daudin) and *lapemoides* (Gray) that I cannot escape the conviction that the three will eventually be united. Certain specimens, indeed, can be definitely referred to one or other of these three forms by the possession of certain groups of characters which seem to mark very definite specific differences. But, on the other hand, many specimens present these same characters in varying combinations of such extreme confusion that it is impossible to place them with certainty with either of the three species, to all of which they show almost equal affinity. I am strongly of opinion that these specimens

are intermediate forms which unite the three supposed species, and am opposed to the view held by all previous herpetologists that such forms should each rank as species apart. This old view seems to me responsible for much of the extreme confusion into which the subject has fallen, and this is not surprising since the characters made use of to differentiate these pseudo-species are precisely those which I have remarked upon above as very variable in individuals of many well defined species of this genus.

*subcincta* (Gray).—This species was described over 60 years ago from the solitary type in the British Museum which still remains the only specimen known. In Mr. Boulenger's key to the genus *Distira* (vol. iii, p. 287), it is separated from *brugmansii* on two points, viz., that the neck scales in *subcincta* are 23 to 25, in *brugmansii* 27 to 31, and that the frontal is hardly as long as its distance to the rostral in *subcincta*, whereas it is as long or longer in *brugmansii*. To make any reference to the length of the frontal as a distinction between these two supposed species amounts to an eloquent admission of the extremely close resemblance between them, for the length of this shield in *brugmansii* by Mr. Boulenger's own showing varies considerably, viz., between its distance to the rostral and its distance to the end of the snout. I

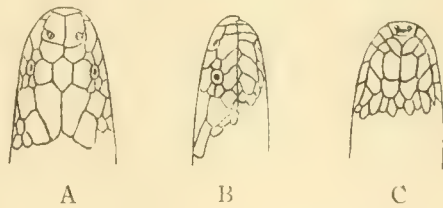


Fig. 20.—*Distira subcincta*. After Günther, *Rept. Brit. Ind.*, pl. xxv, fig. F.

can find no points of difference in the two species, nor does Mr. Boulenger mention any in his detailed descriptions other than those already referred to, and I cannot doubt that this solitary specimen of *subcincta* should, therefore, be considered a *spiralis* vel *brugmansii*. The low number of neck scales is not by itself sufficient to form the basis of a distinct species, and, moreover, agrees with that of some specimens of *melanocephalus*, which I am unable to separate from *spiralis*.

The colour of *subcincta* is unusual, in that there are round costal spots below the dorsal bars, a peculiarity, however, not necessarily opposed to its inclusion with *spiralis*, since an exactly similar colour variety is included by Mr. Boulenger with his species *ornata*, a form usually characterised by dorsal bars.

*melanocephalus* (Gray), described in 1849 from a single specimen in the British Museum, remained the sole representative till 1901. In that year I saw in Mr. Owston's collection 19 specimens from the Loo Choo Islands which I examined (nine in detail) and identified as *D. robusta* (Günther), i.e., *brugmansii* (Boie). One of these I sent to the British Museum and learnt from Mr. Boulenger he considered *H. melanocephalus*. This species, in his catalogue description, differs from *brugmansii* in two points only, viz., that the head and fore-body are smaller and the neck scales fewer in number in *melanocephalus*.

I have re-examined the specimen I presented to the British Museum, and find



that the posterior maxillary teeth are grooved, and it exactly accords with specimens of *spiralis* (vel *brugmansii*) except in the lower number of neck scales. These in the two museum specimens of *melanocephalus* are 25 and 24, but in the nine I specially

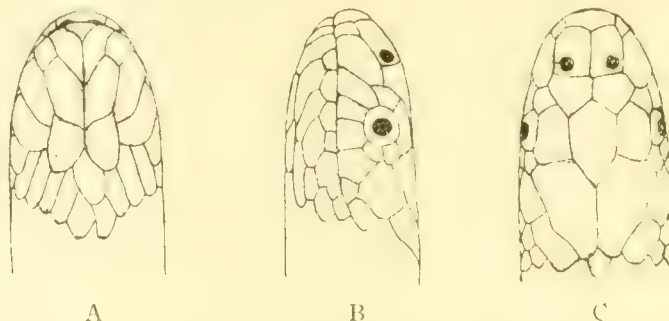


Fig. 21.—*Distira melanocephala*,  $\times 2$ .

examined in Japan they ranged from 23 to 27, the latter number being already recorded for *spiralis*. It is, therefore, impossible to draw a dividing line between the two species, and I take the view that *melanocephalus* is a local variety of *spiralis* characterised by rather fewer neck scales.

*melanosoma* (Günther).—This is only known from a single specimen in the British Museum which I cannot see differs in any way from *spiralis*, vel *brugmansii*, except in colour. The sole distinction between the two utilised by Mr. Boulenger in his key (p. 287) is that the posterior chin shields are in contact in *brugmansii*, separated in *melanosoma*. His detailed descriptions of the scale characters in each show complete accord in every other particular, nor can I, by careful examination of the specimens side by side, find any differences between them. As regards the chin

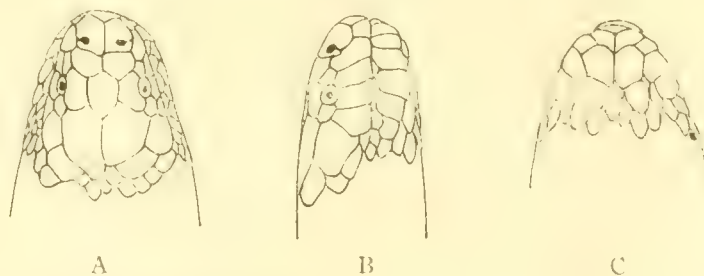


Fig. 22.—*Distira melanosoma*. After Günther, *Rept. Brit. Ind.*, pl. xxv, fig. E.

shields, they are variously separated or in contact in many species, and are separated in at least three others of the large series of *spiralis* examined by me. The colour is certainly peculiar, in that the black bands are unusually broad, and *melanosoma* might, I think, be conceded the rank of a colour-variety, characterised by the breadth of its annuli. The postocular is single, as correctly stated in Mr. Boulenger's description (p. 291), not two as incorrectly given in his key (p. 287).

*longiceps* (Günther).—This is known from a single specimen in the British Museum in which I find the post-maxillary teeth are grooved. Its affinities are extremely close to both *spiralis* and *cyanocincta*, in fact it combines the distinguishing characters of both these forms so intimately that it is difficult to decide to which to refer it. I incline to the opinion that it should rank with *spiralis* on account of the costals in

the fore, and midbody being respectively 28, and 33 to 34. I hold that the costals carry greater weight than the postoculars and temporals. The latter, in this specimen, conform to the generality of examples of *cyanocincta*, but these shields being subject to some

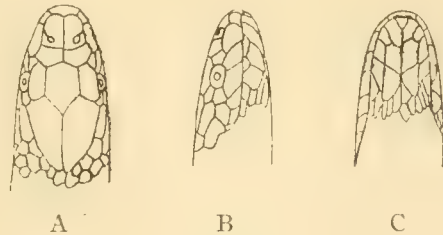


Fig. 23.—*Distira longiceps*. After Günther, *Rept. Brit. Ind.*, pl. xxv, fig. O.

variation in both these forms prompts me to regard them as abnormal in this instance.

The one other departure from the normal mentioned by Mr. Boulenger is the juxtaposed character of the posterior costals. Personally I found it extremely hard to decide for myself whether these scales were imbricate or juxtaposed, and finally decided they were juxtaposed dorsally and subimbricate ventrally. I do not attach sufficient weight to this character to consider it should justify separating this form from *spiralis*, and even granting that the scales are juxtaposed ventrally behind, the fact that Mr. Boulenger himself in one case at least, viz., *fasciata* (Schneider), places specimens with the scales imbricate, together with others that are juxtaposed, makes it probable that a similar deviation from the normal may be expected in other species.

*wrayi* (Boulenger).—As recently as 1900 Mr. Boulenger described this as a new species from a specimen sent from Perak. I have examined the three available specimens so labelled in the British Museum, the only ones known. One of them is so labelled by an oversight, for it is obviously a very typical specimen of *gracilis* (Shaw). Of this there is no possible doubt. The other two I examined beside specimens of *spiralis* and *brugmansii*, but failed to detect in them one feature by which they could be distinguished. One of them is peculiar in having no marginals. Referring to Mr. Boulenger's description of *D. wrayi*,<sup>1</sup> and comparing it with his description of *brugmansii* in his catalogue,<sup>2</sup> I find they completely agree, except in two extremely minute details, viz., the length of the frontal which it is claimed is rather shorter in *wrayi*, and carination which is more pronounced in *wrayi*. Such minute differences, especially affecting features which are subject to considerable variation, appear to me very unconvincing. I cannot even agree that the differences claimed are any more noticeable than is seen in certain examples of *brugmansii* in the British Museum.

*floweri* (Boulenger).—This is known from two specimens only, both in the British Museum. Though placed by Mr. Boulenger with his genus *Hydrophis*, the post-maxillary teeth are grooved, and had this circumstance been noticed by him, I cannot but think he would have referred them to *brugmansii*. From this species I can only separate it by (1) the absence of marginals, and (2) the failure of the præfrontal to meet the second supralabial. The absence of marginals is remarkable, the only other instance of these shields being wanting among the specimens I consider alike being

<sup>1</sup> Ann. and Mag. Nat. Hist. v, 1900, p. 307.

<sup>2</sup> III, p. 293.



in one of the specimens labelled *wrayi*, and it is noteworthy that the specimens labelled *wrayi* and *floweri* are all from the same locality, *viz.*, Perak. The failure of the præfrontal to meet the second supralabial is only partial, for this contact occurs on one

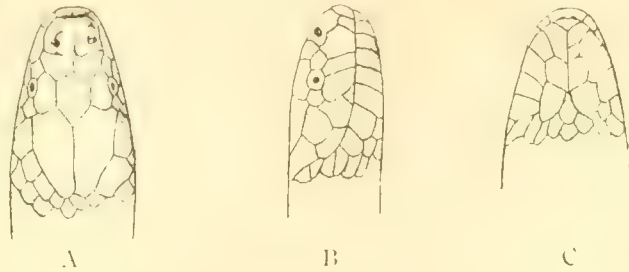


Fig. 24.—*Distira (Hydrophis) floweri*,  $\times 1\frac{1}{2}$ . After Boulenger in *Proc. Zool. Soc.*, 1898.

side in one of the specimens. I have observed the same abnormality in eight of the large series I consider *spiralis*. I am strongly of opinion these specimens should be regarded as an abnormal form of *spiralis* (Shaw).

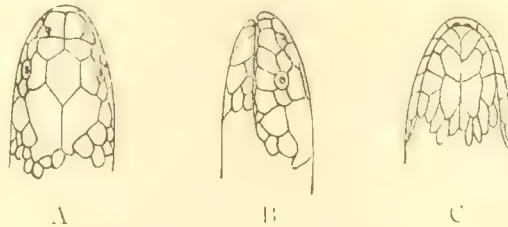


Fig. 25.—*Distira alcocki*.

*alcocki* (Wall). -- Last year I described<sup>1</sup> what I considered at the time a very well marked new species under the above title. I could not satisfactorily view the teeth, as the specimen was a very small one, and placed it with the *Hydrophis* on account of the slender proportions of the neck.

In most respects very like *brugmansii* the fact that the præfrontal shield did not meet the second supralabial, taken with the low number of scales in the neck (25), and body (30), and the small number of ventrals (282) made it difficult to know where to place it. I find now, however, that of 65 specimens in my notes which I identify as *spiralis* the præfrontal fails to meet the second supralabial in seven other instances,<sup>2</sup> including the type-specimen of *spiralis* in the British Museum. I find also that other examples afford parallel or nearly parallel departures from the normal with reference to the three other details made mention of, and so I have no hesitation whatever in considering this snake now as a somewhat aberrant example of *spiralis*.

The characters upon which reliance is placed to separate *spiralis* from *cyanocincta* are all subject to some variation in both species, and specimens occur combining these characters sometimes so intimately that it is difficult to decide with which form to place them; indeed, it seems to me very dubious whether they can be considered apart. Of 12 specimens labelled *brugmansii* in the British Museum, a form I hold to be synonymous with *spiralis*, three I consider are misplaced, and should be included with

<sup>1</sup> *Memoirs As. Soc. Bengal*, 1906, p. 288.

<sup>2</sup> I have signally failed to bring these six specimens together by any combination of characters.

*cyanocincta*. These specimens are Jayakar's from Muscat, the type of *H. sublævis*, and Cantor's specimen from Penang. They are all included with *brugmansii*, presumably on their possession of a large single anterior temporal, but there are, I consider, weightier reasons for supposing them aberrant examples of *cyanocincta* to which I will refer again. The differences I can see between typical examples of each form are as follows:—

<i>spiralis.</i>	<i>cyanocincta.</i>
(1) One postocular.	Two postoculars.
(2) One anterior temporal.	Two anterior small superposed temporals.
(3) A single marginal after the third infralabial.	A complete row of marginals after the second infralabial.
(4) Costals in midbody 29 to 36; 2 to 7 more than anteriorly.	Costals in midbody 33 to 44; 7 to 11 more than anteriorly.

I attach far greater weight to the costal rows than any of the other characters concerned; and in the three specimens I refer to, I make them 39, 39 and 41 respectively, and from eight to ten more in midbody than anteriorly. In addition to this there is a complete row of marginals after the second infralabial in all, and two postoculars in one specimen. On the other hand, each has a single anterior large temporal, and two a single postocular. I may remark here that the features which I take to be abnormal in these specimens are exactly on a par with those made use of to separate *grandis* from *cyanocincta*, and it seems most inconsistent to grant to one trio, viz., *grandis*, the rank of a species and withhold this distinction from the other trio.

*Description*.—This is based on my conception of the species based on 65 examples.

Body anteriorly from one to two-thirds the greatest depth, probably less as my notes on this point are scanty, and I have no record of a gravid female.

Rostral,—the portion visible above less than two-thirds the internasal suture. Præfrontals,—touch the second supralabials (eight exceptions, one of these on one side only). Postoculars,—one. (Eleven exceptions, of which five are normal on one side only). Temporals,—one large anterior succeeded by a subequal shield. In 23 examples the anterior by a confluence with a supralabial reaches the labial margin, and in 12 of these this occurs on one side only. In six examples there are two superposed anterior small shields, in four of these on one side only. The posterior shield is subject to greater variation than the anterior. Supralabials,—6 to 8; the anterior 4, 5 or 6 usually undivided and well developed; the third and fourth (and in nine examples, the fifth also) touch the eye. Infralabials,—four; the last in contact with three or four scales behind; the suture between the first usually smaller than that between the anterior sublinguals. Marginals,—one usually, after the third sublingual (sometimes two or more after the second or third. Wanting in three examples, one of *wrayi* and both *floweri* in the British Museum). Sublinguals,—two well developed pairs, the fellows of each in contact. (The posterior separated completely in four specimens). Costals,—anteriorly 23 to 31 (usually 25 to 29), midbody 29 to 36 (usually 31 to 35), posteriorly 28 to 36; imbricate anteriorly; imbricate or subimbricate posteriorly; usually smooth in the young, feebly or strongly



tuberculate in large adults, the tubercles often bi- or tridentate. Ventrals,—282 to 373; entire throughout, except a few posteriorly; twice or less than twice the breadth of the last costal row. Colour,—olivaceous or greenish dorsally, merging to yellowish costally and ventrally, or yellowish with dark bars or bands, which may number from 34 to 70, but are most usually from 40 to 55. I group the various forms as follows, and it will be noticed how very alike the varieties of this are to those of *cyanocincta*:—

Group (A) completely banded. The bands are very variable. In some examples they are narrow throughout, in others broad. In some they are of even breadth from dorsum to ventrum; in others dilated vertebally; in others tapering ventrally. Some of the posterior ones are interrupted costally in some specimens. In some instances the black is only preserved for a variable depth dorsally, but the indication of the completely black band of younger days can, though faint, be distinctly traced ventrally, and also the ventral connecting band so commonly retained in adult life.

In some the bands are discrete vertebally and ventrally, and in others more or less confluent, especially ventrally, where a broad stripe very frequently passes from the throat to a variable extent backwards, and not uncommonly in the whole length of the snake.

- (1) *brugmansii* (Boie).—Bands narrower than interspaces; no vertebral nor ventral spots. It is one of the commonest varieties. *robusta* (Günther), *bishopi* (Murray), and *melanocephalus* (Gray) I place here.

The form is very analogous to var. B of *cyanocincta*.

- (2) *spiralis* (Shaw).—Differing from the last only in exhibiting one or more vertebral spots placed singly in the interspaces. There are usually a few only anteriorly or posteriorly, but a regular series is exceptional. In fig. 26 on plate vii these are not visible at all. It is from a specimen so labelled in the British Museum.
- (3) Similar to the last, with in addition a series of similarly placed ventral spots, which may be as variable in number as the vertebral series of the last. It is an unusual form. The only example I have seen, an adult, is in the Colombo Museum (No. 113). The vertebral and ventral spots are very black, and form unusually regular series.
- (4) Bands nearly as broad, or broader than the light intervals, and frequently connected in part, or wholly, by a broad ventral stripe of black. Head black. With this I place *melanosoma* (Günther) (see fig. 27 on plate viii), *floweri* (Boulenger), and *alcocki* (Wall). It is rather an unusual variety analogous to variety A of *cyanocincta*.
- (5) *subcincta* (Gray).—With a series of costal spots. An unusual variety, the type of which is from the Indian Ocean. It is analogous to variety 4 of *ornata*, and somewhat like variety D(a) of *cyanocincta*.
- (6) Barred dorsally but no costal spots. The type-specimen is from the Indian Ocean. With this I place the *temporalis* of Blanford, the type of which came from the Persian Coast, and *longiceps* (Günther). I have

seen other specimens from Bombay and Karachi, but it is an uncommon form. Analogous to variety D(b) of *cyanocincta*.

- 6(a) A form intermediate between these two groups is to be seen in a specimen in the British Museum from Madras presented by Mr. Henderson. In this there are complete bands anteriorly, and dorsal bars posteriorly. Analogous to variety A (c) of *cyanocincta*.

Group (B) with transverse dorsal bars.

#### DISTIRA CYANOCINCTA (Daudin).

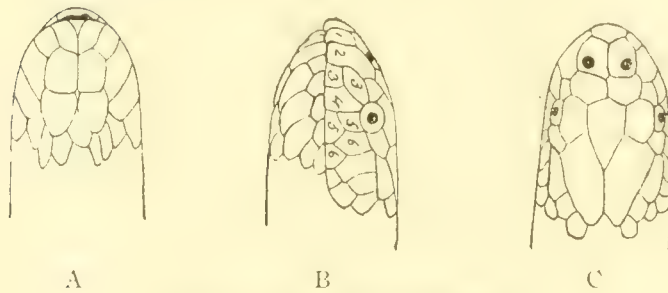
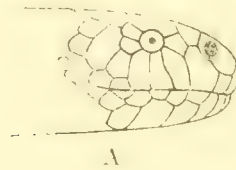
“Chittul,” *Russell, Ind. Serp.*, 1801, ii, pl. ix.

*Hydrophis cyanocincta*, *Daud., Rept.*, 1803, vii, p. 383.

- ? „ „ *Peters in Mon. Berl. Acad.*, 1872, p. 852, pl. 1, fig. 2.  
 „ „ *Günther, Rept. Brit. Ind.*, 1864, p. 367.  
 „ „ *Fayrer, Thanatoph. Ind.*, 1874, pl. xxiii.  
 „ „ *Ewart, Pois. Snakes Ind.*, 1878, pl. 17.  
 ? „ „ *Murray, Vert. Zool. Sind*, 1884, p. 391.  
 „ *tuberculata*, *Anderson in Journ. As. Soc. Bengal*, 1871, pt. 2, p. 18.  
 „ „ *Murray, loc. cit.*, p. 393.  
 „ *dayanus*, *Stoliczka in Proc. As. Soc. Bengal*, 1872, p. 89.  
 „ *subannulata*, *Gray, Cat.*, 1849, p. 54.  
 „ *aspera*, *Gray, Cat.*, p. 55.  
 „ „ *Günther, loc. cit.*, p. 365.  
 „ *crassicollis*, *Anderson, loc. cit.*, p. 19.  
 „ „ *Fayrer, loc. cit.*, pl. xxii.  
 „ „ *Ewart, Pois. Snakes Ind.*, 1878, pl. 16.  
 „ *trachyceps*, *Theobald, Cat. Rept. As. Soc. Mus.*, 1868, p. 70.  
 „ *phipsoni*, *Murray in Journ. Bomb. Nat. Hist. Soc.*, ii, p. 32 and pl.  
 ? „ *westermanni*, *Jan, Icon. Gén.*, 1872, 39, pl. v, fig. 1.  
 „ *doliata*, *Gray, Cat.*, 1849, p. 51.  
*Aturia belcheri*, *Gray, Cat.* (1849), p. 46.  
*Hydrophis belcheri*, *Günther, Rept. Brit. Ind.*, 1864, p. 364.  
*Distira belcheri*, *Boulgr., Cat.* iii, 1896, p. 296.  
 ? *Hydrophis frontalis*, *Jan, loc. cit.*, 39, pl. v, fig. 2 (*non Boulgr.*).  
 „ *sublævis*, *Gray in Zool. Misc.*, 1842, p. 62, and *Cat.*, 1849, p. 52.  
 „ *elegans*, *Günther, loc. cit.*, p. 369, pl. xxv, figs. K & K'.  
 ? „ *semperi*, *Garman in Bull. Mus. Comp. Zool.*, 1881, p. 85.  
 „ *pacificus*, *Boulgr., Cat.*, 1886, iii, p. 278, pl. xii, fig. 2.  
 „ *kingii*, *Boulgr., Cat.*, 1896, iii, p. 276.  
 ? „ *striatus*, *Schlegel, Phys. Serp.*, 1837, p. 502, pl. xviii, figs. 4 and 5.  
*Aturia elegans*, *Gray in Zool. Misc.*, 1842, p. 63.  
*Chitulia fasciata*, *Gray, Cat.*, 1829, p. 56.  
*Distira belcheri*, *Boulgr., Cat.*, iii, p. 296.  
 „ *semperi*, *Boulgr., Cat.*, iii, p. 292.



- Distira tuberculata*, Boulgr. in *Blanford, Fauna Brit. Ind. Rept. and Batrach.*  
1890, p. 409, and *Cat.*, iii, p. 293.
- „ „ *Sclater, List Snakes Ind. Mus.*, 1891, p. 65.
- „ *lapemidoides*, *Sclater, loc. cit.*, p. 66, Nos. 8278 and 8632.
- „ *grandis*, Boulgr., *Cat.*, iii, p. 292, and pl. xvi.
- „ *macfarlani*, Boulgr., *Cat.*, iii, p. 294, and pl. xvii.
- „ *cyanocincta*, Boulgr. in *Blanford, Fauna Brit. Ind. Rept. and Batrach.*,  
1890, p. 410, and *Cat.*, iii, p. 294.
- „ „ *Wall in Proc. Zool. Soc. Lond.*, 1903, p. 96, and *Mem. As.*  
*Soc. Bengal*, 1906, p. 291, and in *Spol. Zeylan.*, August  
1907, p. 171.
- „ „ *Sclater, loc. cit.*, p. 65. (Except No. 8242).

Fig. 28.—*Distira cyanocincta*.

A



B

Fig. 29.—*Distira westermanni*. After Jan, *Icon. Gén.* livr. 39, p. v, fig. 1.

The specific title originated with Daudin, who applied it to the original of plate ix. in Russell's second volume. A specimen now in the British Museum collected by Russell and labelled from the Sunderbunds is, without doubt, this very specimen; for Russell, on the last page of this volume, mentions the Sunderbunds as the locality from which the original of this plate was obtained. Mr. Boulenger omits to record the discovery of this type, which had previously been lost sight of.

With this species, I am of opinion, should be united several forms previously described as distinct by various authors, and considered as such by Mr. Boulenger in his Catalogue (1896). All of these appear to me to be separated on insufficient grounds affecting shields, which analogy shows to be inconstant in many individuals of certain

species. Most of these specimens I have carefully compared side by side with the specimens labelled *cyanocincta* in the British Museum, and my opinion is the only possible one I see open to me. The forms are as follows: *kingi* (Boulenger), *elegans* (Gray), *pacificus* (Boulenger), *semperi* (Garman), *tuberculata* (Anderson), *grandis* (Boulenger), *macfarlani* (Boulenger), *belcheri* (Gray), and *frontalis* (Jan).

*kingi* (Boulenger).—This form rests on the single specimen so named by Mr. Boulenger which is in the British Museum. Contrary to his belief the posterior maxillary teeth are grooved. The only differences apparent in the descriptions of this and *cyanocincta* in Mr. Boulenger's catalogue are trifling and affect the proportions of the rostral, nasals and frontal, the scales in the body and the relative proportion of the head to the body. I think the slender differences claimed in the head shields may be dismissed without comment. The scales in the body in *kingi* (37) are only two less than the range given by Mr. Boulenger for *cyanocincta*, and come well within the range given me by my large series of specimens (35 to 44). The head in *kingi* recorded as one-third the extreme body depth is within the variation I have observed in examples of *cyanocincta*.

I see no reason, therefore, to suppose this a species separable from *cyanocincta*.

It is to be noted that this specimen was placed by Gray with his *doliata*, a form subsequently united by Mr. Boulenger with *elegans* of the same author (Gray), which form I am unable also to separate from *cyanocincta*.

*elegans* (Gray).—The three young specimens so named in the British Museum and the only ones known, constitute, I think, a very distinct colour variety of *cyanocincta*, but no more. I have failed, I find, to record the condition of the posterior maxillary teeth, possibly owing to the small size of the specimens. A comparison of Mr. Boulenger's descriptions of the two forms shows they are identical except for the single anterior temporal, and the slightly shorter frontal shield in *elegans*. A single anterior temporal occurs in at least five of the British Museum specimens of *cyanocincta*, so this feature cannot be made use of to differentiate this from allied forms. A comparison of these three specimens with many *cyanocincta* made it impossible for me to consider them apart.

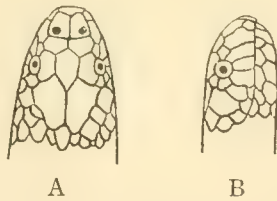


Fig. 30.—*Distira pacifica*. After Boulenger, *Cat.*, vol. iii, pl. xii, fig. 2.

*pacificus* (Boulenger).—Known from a single adult specimen in the British Museum from New Britain. I find that the posterior maxillary teeth are grooved, and a careful comparison of this with specimens labelled *cyanocincta* in the same collection shows no points by which it is possible to separate it from them. The neck-scales of *pacificus*, correctly stated in Mr. Boulenger's description (Catalogue, page 279), are wrongly given in his key (page 272); the correct count, *viz.*, 27 to 29, agrees with



that of typical *cyanocincta*. According to Mr. Boulenger the rostral shield in *pacificus* is a little narrower and the frontal a little longer than in *cyanocincta*, and there is a single anterior temporal, but the remarks made on *elegans*, *kingi*, etc., apply equally here. I cannot doubt that, had Mr. Boulenger recognised the grooved condition of the posterior maxillary teeth in these species, he would long ago have included them in his *D. cyanocincta*, as the varying scale characters on which they are separated from each other are all to be found in one or other of the large series of 29 specimens in the British Museum assigned to that species, e.g., the two anterior temporals of *kingi* and the one of *elegans* and *pacificus*.

*semperi* (Garman).—Not represented in the British Museum and known only from Garman's description of a single specimen from Lake Taal, Luzon. Mr. Boulenger includes this specimen in his genus *Distira*, but separates it in his key under the points—(a) "Second pair of chin shields, if distinct, separated by several scales." (b) "A single anterior temporal." Garman's description makes no mention of the separation of the posterior chin shields, and there is no plate of the specimen. Further, he says that the seventh labial is separated from the temporal by a large pentagonal plate, which clearly must constitute what many consider an *inferior* temporal shield. I cannot, therefore, separate this from *cyanocincta*.

*tuberculata* (Anderson).—Of this there is no specimen in the British Museum, but I have examined in the Indian Museum the type and only specimen which was described by Anderson in 1871, and have no hesitation in considering it *cyanocincta*. From this species Mr. Boulenger separates it by its single anterior temporal and the large number of neck scales given as 38. This number is Anderson's count, close behind the head where the rows are always too variable to give reliable results. The scales counted two heads-lengths behind the head number 32, and at midbody 40, both of which numbers accord with those usually found in specimens of *cyanocincta*; and it has already been pointed out that a single temporal shield is sometimes present in members of that species. The head shields of Anderson's *tuberculata* are granular and the body scales bi-tuberculate, as is so often the case in large specimens of *cyanocincta*, e.g., the *H. aspera* of Gray incorporated by Mr. Boulenger in this species.

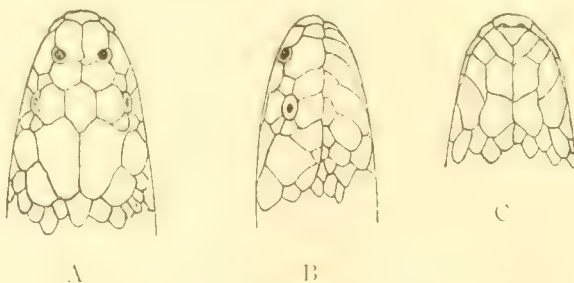


Fig. 31.—*Distira grandis*. After Boulenger, *Cat.*, vol. iii, pl. xvi.

*grandis* (Boulenger).—This species rests on three specimens so named in the British Museum. These, on careful examination, I cannot separate from the species *cyanocincta*. The distinctions made use of in Mr. Boulenger's key are that in *grandis* there is a single anterior temporal shield only, the rostral is slightly narrower and the ventrals

rather more in number, 372—400 against 281—385 (*cyanocincta*). As before stated, a single anterior temporal shield occurs in several museum specimens of *cyanocincta*, the breadth of the rostral is always more or less variable in every species, and I count the ventrals 306, 325 and 375 in the three specimens labelled *grandis*, these numbers falling well within the limits given for *cyanocincta*.

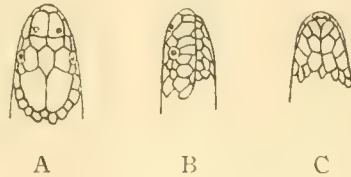


Fig. 32.—*Distira macfarlani*. After Boulenger, *Cat.* iii, pl. xviii, fig. 1.

*macfarlani*.—Only known from two young specimens in the British Museum considered a distinct species by Mr. Boulenger. His description of them differs only from that of *cyanocincta* in the following points: The nasal and frontal shields appear to be proportionately a shade longer in *macfarlani*, the neck scales slightly more and the ventrals considerably fewer in number. The first points are of no importance in differentiation, and the neck scales given as 31—35 in the two specimens are 33 in both at the point two headlengths behind the head which I find to give the most consistent results. With regard to the ventrals, Mr. Boulenger's numbers 220 and 256 are incorrect, and by repeated counts I find them to be 342 to 349 and 385 to 392 respectively.<sup>1</sup> I have, therefore, no hesitation in including these two specimens in the species *cyanocincta*.

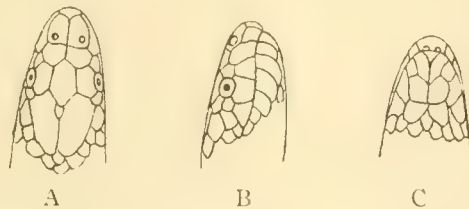


Fig. 33.—*Distira belcheri*. After Boulenger, *Cat.*, vol. iii, pl. xvii, fig. 2.

*belcheri* (Gray).—This is known from a solitary specimen, which was obtained 58 years ago from New Guinea, and is preserved in the British Museum collection. The only points claiming attention I can see between this and typical specimens of *cyanocincta* are: (1) The absence of marginals; (2) the contact of the fourth supralabial only with the eye; and (3) the number of costal rows. Of these, the absence of marginals I consider a very important point, though previous herpetologists have completely ignored the existence of these shields. In my large series of *cyanocincta*, no specimen has these shields wanting; but as a certain degree of inconstancy in this direction is to be seen in individuals of some other species, I think the absence in this case is best considered an aberrant feature. I attach little importance to the contact of the fourth supralabial only with the eye, as the third is only just excluded. The costal rows anteriorly (25) are but one less than the limits furnished by my numerous examples,

<sup>1</sup> It may appear strange to record the ventrals variously in the same individual, but it is extremely difficult to count these shields accurately in certain specimens (see my final remarks under ventrals in my prefatory notes).



and in midbody the number (34), though low, agrees with Anderson's specimens in the British Museum labelled *cyanocincta* from Mergui, in which they are 33 to 34. The affinities of the specimen are so extremely close to *cyanocincta* that I cannot believe it is distinct.

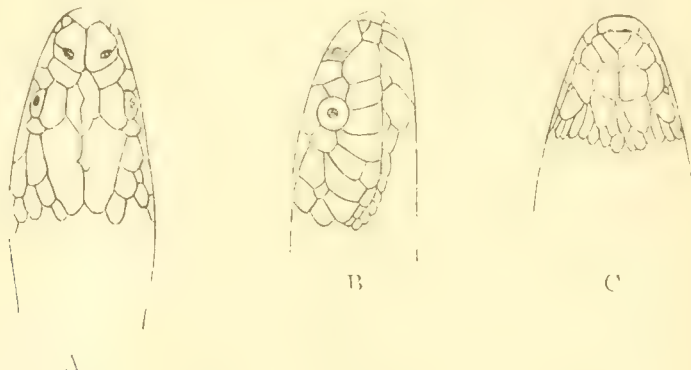


Fig. 34.—*Distira frontalis* ( $\times 1\frac{1}{2}$ ). After Jan, livr. 39, pl. v, fig. 2.

*frontalis* (Jan).—This name was given by Jan to a single specimen which he described and figured; and Mr. Boulenger similarly names one specimen in the British Museum collection. The two were probably considered identical on their common possession of one unusual feature, *viz.*, that the anterior angle of the frontal shield projects, and separates the præfrontal pair. This, however, is clearly an abnormality, for I have seen the same condition in more than one specimen of *viperina* and occasionally in other species; and Mr. Boulenger notes that it occurs in the type-specimen of *brookii* (Catalogue, vol. iii, p. 283), a gravid female, though absent in her fully developed young. Apart from this abnormality the British Museum specimen appears to me to be an almost typical *ornata* (Gray), and the posterior maxillary teeth being grooved, I include it in that species. Jan's specimen, however, I am unable to separate from members of the species *cyanocincta* (Daudin). It does not accord with Mr. Boulenger's description of *H. frontalis* on page 276 of the Catalogue in the following particulars: The neck is not very slender, being about three-fifths the body depth; the labials are eight, with the third, fourth and fifth touching the eye; both pairs of chin shields are well-developed and the posterior are only just separated. I count 30 scales in the anterior body. Though unable to verify the presence of grooves in the teeth, it appears to me probable that this will prove to be a *cyanocincta* aberrant in the division of the first supralabial, the division of the frontal and the separation of the præfrontals, all of which conditions are to be met with as abnormalities in certain individuals of other species.

*Description*.—This is based on 81 examples, inclusive of 12 considered distinct by Professor Boulenger, which I think the same. The body anteriorly is from one-third to two-thirds the greatest depth, probably less, my notes on this point being very incomplete; and I have no record of the measurements in a gravid female.

Rostral,—the portion visible above is less than two-thirds the internasal suture. Præfrontals,—touch the second supralabial. (Two exceptions and on one side only.) Postoculars,—two usually. (In eleven examples only one, and in five of

these on one side only.) Temporals,—usually broken up and replaced by two or more superposed scales anteriorly. (A well developed single anterior shield occurs in sixteen specimens,<sup>1</sup> and in four of these on one side only.) Supralabials,—subject to great variation, the third and succeeding shields subject to division; the third and fourth, and usually the fifth, touch the eye. Infralabials,—four; the last in contact with three or four scales behind; the suture between the first usually less than that between the anterior sublinguals. Marginals,—usually a complete row after the second supralabial<sup>2</sup> (sometimes one, or more after the third). Sublinguals,—two well-developed pairs, the fellows of each in contact. (In six examples the posterior are quite separated.) Costals,—anterior, 25 to 36 (usually 28 to 33); midbody 33 to 44 (usually 36 to 41); posteriorly 34 to 43, imbricate, or subimbricate throughout. Ventrals,—280 to 397, distinct everywhere; twice or nearly thrice the breadth of the last costal row.

Colour.—The many varieties have been summed up by Mr. Boulenger, and I have little to add to his arrangement.

A. Well-defined black bands, more or less connected ventrally. Analogous to variety A. (4) of *spiralis*.

(a) All the bands complete. A common form ranging from the Persian Gulf to the Philippines. With this I would place the *semperi* of Garman.

(b) Some of the posterior bands interrupted costally or subcostally. Not uncommon. In the British Museum, in Reeves' specimen from China, and others, the bands are briefly interrupted costally. In a specimen of Jayakar's, from Muscat, the interruption is subcostal, and more extensive. Ventral spots occur corresponding to the dorsal bars. With this *macfarlani* (Boulenger) should be placed (see fig. 36 on plate viii). It occurs between the Persian Gulf and Australia.

(c) Some of the posterior bands deficient ventrally, and thus converted into bars. Not uncommon. With this I would include *kingi* (Boulenger) from Australia. Analogous to variety 6(a) of *spiralis*.

B. Well-defined black bands not united ventrally. A common form occurring between the Persian Gulf and China. With this I would place the *tuberculata* of Anderson. Analogous to variety *brugmansii* of *spiralis*.

C. Obscure bands or bars. A common form usually met with in adult specimens, and occurring between the Persian Gulf and the Philippines. With this, I think, should be included the *crassicollis* of Anderson, the *grandis* of Boulenger, *aspera* of Gray, and *pacificus* of Boulenger. Analogous to specimens of variety A(6) of *spiralis*.

D. Well-defined dorsal bars.

(a) Costal, and subcostal spots. An uncommon form from Australia, *viz.*, the *elegans* of Gray (see fig. 37 on plate viii). Somewhat comparable to variety A(5) of *spiralis*.

<sup>1</sup> Five of these are British Museum specimens labelled *cyanocincta*.

<sup>2</sup> None in one specimen, *viz.*, *belcheri*, in the British Museum.



(b) No costal spots. A common form seen in examples from the Persian Gulf to China. Comparable to variety A(6) of *spiralis*.

E. A continuous, black, dorsal band (see fig. 35 on plate viii), a rare form—the *phipsoni* of Murray known from a single specimen from Bombay. Completely analogous to variety *inornata* of *ornata*, and *jayakari* of *viperina*.

*Habitat*.—From Persian Gulf to North Australia. With the exception of two *grandis*, none that I have seen are from the Malayan Archipelago.

#### DISTIRA NIGROCINCTA (Daudin, nec Jan, nec Cantor).

*Hydrophis nigrocinctus*, Daud., *Rept.*, 1803, vii, p. 380.

- ?    "               "       *Schlegel, Phys. Serp.*, 1837, xviii, figs. 11 and 12.  
       "               "       *Gray, Cat.*, 1849, p. 51.  
       "               "       *Günther, Rept. Brit. Ind.*, 1864, p. 368, pl. xxv, fig. L.  
       "               "       *Fayrer, Thanatoph. Ind.*, 1874, pl. xxv.  
       "               "       *Ewart, Pois. Snakes Ind.*, 1878, pl. 19, fig. 2.  
       "               "       *Boulgr. in Blanford, Fauna Brit. Ind. Rept. and Batrach.*,  
                               1890, p. 400.  
       "               "       *Sclater, List Snakes Ind. Mus.*, 1891, p. 63, Nos. 8239  
                               and 8240.  
       "               "       *Boulgr., Cat. Brit. Mus.*, 1896, iii, p. 277.  
       "               "       *Wall in Mem. As. Soc. Bengal*, 1906, p. 281.

? *Enhydris nigrocinctus*, Merrem., *Tent.*, 1820, p. 140.

*Distira lapemidoides*, Sclater, *List Snakes Ind. Mus.*, 1891, p. 66, No. 8235.

- "   *cyanocincta*, Wall and Evans in *Journ. Bomb. Nat. Hist. Soc.*, xiii, p. 364.  
       "   *hendersonii*, Boulgr. in *Journ. Bomb. Nat. Hist. Soc.*, xiv, p. 719, and  
           plate.  
       "               "       *Wall in Mem. As. Soc. Bengal*, 1906, p. 294.  
       "               "       *saravacensis*, Boulgr. in *Proc. Zool. Soc. Lond.*, 1900, p. 184,  
           and fig. 2, pl. xiv.

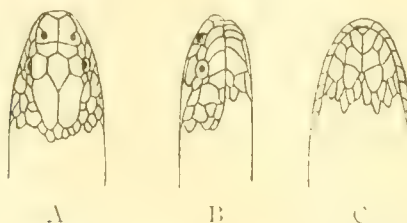


Fig. 39.—*Distira nigrocincta*. After Günther, *Rept. Brit. Ind.*, pl. xxv, fig. L.

I have examined eight examples, not including the *Distira hendersonii* (Boulenger), which I consider the same species.

One of General Hardwicke's specimens in the British Museum, labelled *nigrocinctus*, I consider misplaced. It is in reality a *cyanocincta* (Daudin). In Bleeker's specimen I could distinctly discern grooves in the post-maxillary teeth, and it agrees, therefore, in this respect, with examples I have examined in the Indian Museum and my own

specimens from Burma. I consider the species fairly well differentiated, but it is in most respects extremely like *cyanocincta*. The præfrontal, however, does not touch the second labial, in which respect it differs from *cyanocincta*.

I find the head shields in this species very liable to be broken up, especially the supralabials, and many departures from the type-specimen are, in consequence, to be met with. This I will refer to again.



Fig. 40 —*Distira hendersoni*. After Boulenger, *Journ. Bomb. Nat. Hist. Soc.*, vol. xiv, p. 719.

*Distira hendersoni*.—This is known from a single specimen from Burma described by Mr. Boulenger. A specimen very like it I referred to under that title in the paper I wrote on the Sea Snakes in the Indian Museum. I remarked at the time upon the very close affinities between this and *nigrocinctus* (Daudin). Now that I have examined the types of both and the other specimens of *nigrocincta* in the British Museum, I feel convinced that the two forms are identical, though this view is not borne out by the first glance at the figures I attach herein—the one from Günther representing one of General Hardwicke's specimens labelled *nigrocinctus*, and the other reproduced from Boulenger's figure of the type of *hendersoni*.

The most important distinction between the two claimed by Mr. Boulenger affects the posterior maxillary teeth, which, he observes, are grooved in *hendersoni*. I find these teeth also grooved in *nigrocincta*. In colour and markings the two are peculiar and exactly similar. In the numbers of the scales, ventrals, and in most of the head shields, the two are alike; the apparent differences affecting the latter only, I think, obviously arise from a tendency many of these shields have to division. This same tendency, I may remark, is seen in certain other well defined species, *viz.*, *cyanocincta*, *ornata*, *viperina*, etc. It is particularly noticeable in the supralabials and nasals, though by no means confined to these shields.

The type-specimen of *hendersoni* has, I consider, the second, third, fourth, fifth and sixth supralabials divided on the left side, and the second, third, fifth and sixth on the right. The upper part of the second Mr. Boulenger considers a loreal, the upper part of the third a præocular, and the upper parts of the fourth and fifth on the left side suboculars. On the right side the fourth, being undivided, touches the eye; but if my view, which appears to me the obvious one from analogy, is accepted, the third, fourth and fifth labials touch the eye on both sides. Now some of these shields are similarly divided in specimens labelled *nigrocinctus* in the British Museum, *viz.*, in two out of the three available specimens. (The fourth has been already referred to as a wrongly identified specimen of *cyanocincta*). In the type, and in Bleeker's specimen, a similarly formed "pseudo loreal" is to be seen on the left side only. In the type-specimen the first supralabial is divided into an upper and a lower part.



As regards the shields referred to by Mr. Boulenger as internasals (the sole remaining difference between the two supposed forms) it appears to me that the nasals have been divided into three parts by three sutures radiating from the nostril, and "pseudo-internasals" thus formed. This view is the obvious one suggested by analogy, and, when the three component parts are taken together, it will be noticed they conform to the normal shape of the nasal shields seen in others of this family. A precisely similar division is met with in aberrant examples of *viperina* and *major* and in *Enhydrina valakadyn*, etc., and the condition reminds one of that seen in the parietals in *Enhydris curtus*, which shields, though broken up, preserve their contour. I may remark on other specimens I have examined. One in the Indian Museum, viz., No. 8240 (in which the scales are 31 anteriorly, 43 in midbody, imbricate posteriorly, ventrals 338) has the second, third and fifth supralabials divided as in the type of *hendersoni*, and the fourth entire on both sides. Strictly speaking, the third, fourth and fifth touch the eye. I enter the condition in my note-books thus  $9; 1\frac{2}{2} (\frac{3}{3} + \frac{5}{5}) \frac{6}{6}$ , the bracketed figures of the formula implying contact with the eye.

In another specimen of mine from Burma (in which the scales are 32 anteriorly, 42 in midbody, imbricate posteriorly, ventrals 311) the supralabials are 9, the second and all the succeeding shields are divided, and the fourth and fifth only touch the eye. In another specimen of mine from Burma (in which the scales are 31 anteriorly, 39 in midbody, imbricate posteriorly, ventrals 325), the supralabials are 9, the fifth and subsequent shields are divided on the right side, the second, fourth and succeeding shields on the left, and the third, fourth and fifth touch the eye. Exactly parallel variations are to be met with in specimens of *cyanocincta*, *ornata*, etc., in the same genus, and in *Astrotia stokesi*, *Enhydrina valakadyn*, etc

*Description.*—Neck one-third to two-fifths the greatest body depth. Rostral,—the portion visible above is from half to three-fifths the suture between the nasals. Præfrontals,—touch no supralabial. (It does so on one side only in two specimens). Frontal, is very distinctive, and differs from all the others of this genus, in that the fronto-parietal sutures are about twice as long as the fronto-præfrontals. Præoculars,—one or two independently of any division of the subjacent labials. Postoculars,—two or three. (One on one side in two examples). Temporals,—irregular and scale-like; two or three superposed anteriorly. Supralabials,—very inconstant. All are liable to be divided transversely, and by their division scales formed which may occupy the position of loreals, præ-, sub- or postoculars and temporals; the third and fourth, or third, fourth and fifth may touch the eye. Infralabials,—the fourth is the largest of the series and in contact with three or four scales behind; the suture between the first pair subequal to that between the anterior sublinguals. Marginals,—one after the third infralabial usually (rarely two after the second. In two examples they are completely absent). Sublinguals,—two fairly well-developed pairs, the posterior fellows separated. (In contact in four examples). Costals, anterior 27 to 32, midbody 36 to 43, posterior 36 to 42; imbricate throughout. Ventrals,—311 to 339, entire, and nearly twice as broad as the last costal row throughout. Colour,—olivaceous green dorsally, merging to

bright yellow ventrally. From 42 to 62 dark, well-defined greenish-black bands surround the body, which are from half to two-thirds the breadth of the interspaces at midcosta, and preserve their width throughout, excepting vertebrally where they are expanded. They are not joined ventrally in the anterior part of the body. Head distinctively marked with a curved black moustache on the upper lip, an occipito-nuchal narrow streak to behind the gape, and some black mottling on the crown. A short lateral black band in the neck just behind the occipito-nuchal band.

*Habitat*.—From the Gangetic Delta to the Malay Archipelago.

*DISTIRA LAPEMOIDES* (Gray).

*Aturia lapemoides*, Gray, *Cat.*, 1849, p. 46.

*Hydrophis lapemoides*, Günther, *Rept. Brit. Ind.*, 1864, p. 375.

„ *holdsworthii*, Günther in *Ann. and Mag. Nat. Hist.*, 1872, p. 33.

„ *stewartii* Anderson in *Proc. Zool. Soc. Lond.*, 1872, p. 399.

„ „ *Fayrer, Thanatoph. Ind.*, 1874, p. xxiv.

„ „ *Ewart, Pois. Snakes Ind.*, 1878, p. 49, pl. 18, 1.

*Distira lapemidoides*, Boulgr. in *Blanford, Fauna Ind. Rept. and Batrach.*, 1890, p. 412.

„ „ *Boulgr. Cat.*, 1896, iii, p. 297.

? *Hydrophis hybridus*, Schlegel, *Abbild.*, 1844, p. 115, and pl. xxxvii.

? „ „ *Jan, Icon. Gén.*, 41, pl. v, fig 1.

„ „ *Boulgr. Cat.*, 1896, iii, p. 274.

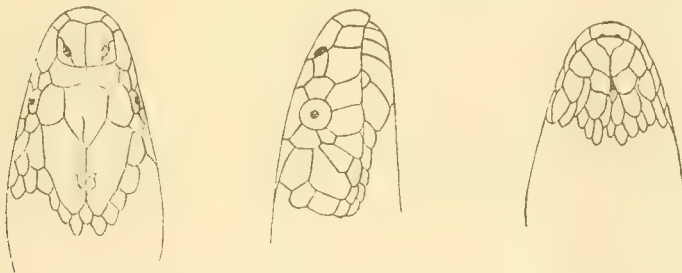


Fig. 42 — *Distira hybrida*. After Jan, *Icon. Gén.*, 41, pl. v, fig 1.

*hybridus* (Schlegel). This form is only known from the single example described, and figured by Schlegel in 1844, and subsequently by Jan in 1872. Not having seen this I am unable to pronounce upon the posterior maxillary teeth, but after an examination of the figures referred to above, and a consideration of the detailed description, the specimen appears to me to agree with *lapemoides* (Gray) as Mr. Boulenger records the costals as juxtaposed, otherwise it would completely agree with *cyanocincta* (Daudin).

This form is separated from *cyanocincta* in Mr. Boulenger's key on one point only, *viz.*, the juxtaposition of the posterior costals. In all other characters it appears by his own showing they agree, and I can find no other difference between the two after a careful comparison. It is very dubious whether this single peculiarity justifies



the separation of the two, especially as specimens of *fasciata* (Schneider) are to be found with the costals imbricate, though normally juxtaposed in that species. I note, too, in reference to a specimen labelled *cyanocincta* in the British Museum, *viz.*, the one presented by Lord Phillips from Bushire, "scales almost juxtaposed." As there is in that Institution a series of nine specimens labelled *lapemoides* in which the posterior costals are very definitely juxtaposed, I think it wiser to adhere to Mr. Boulenger's opinion, though I think it probable these may, at a later date, be relegated to the rank of a variety only of *cyanocincta*. I have examined in all only nine examples.

*Description*.—Rostral,—the portion visible above from half to three-fifths the internasal suture. Præfrontals,—touch the second supralabial (two exceptions in which they touch none). Postoculars,—two or three (one on one side in one example). Temporals,—broken up and replaced by small scales, two or three of which are superposed anteriorly. (One large shield occurs on one specimen on one side). Supralabials,—seven or eight subject to much variation, the third and subsequent shields sometimes divided. In Jerdon's specimen from Madras in the British Museum the third and succeeding shields are all divided, and according to some authorities, therefore, none touch the eye. In Layard's specimen the fourth is divided on the left side, and the same arrangement only reversed on the two sides is seen in the type. In one of Holdsworth's examples the third is divided, and the fourth entire. Infralabials,—four, the last in contact with three or four scales behind; the suture between the first usually less than that between the anterior sublinguals. Marginals,—a complete row succeeds the second or third infralabial. Sublinguals,—two well-developed pairs, the fellows of the posterior pair separated (in at least two examples they just touch). Costals,—anterior 31 to 37, midbody 40 to 49, posterior 37 to 51, juxtaposed posteriorly. Ventrals,—300 to 387, all entire or a few divided posteriorly, twice or less than twice the breadth of the last costal row. Colour,—very variable. Some specimens are completely banded, in others the bands are obsolete ventrally, and converted into dorsal bars. In one of Holdsworth's examples from Ceylon, there are vertebral spots between the bars constituting a variety analogous to the *forma typica* of *spiralis*. In Blanford's specimen from Gwadar the annuli are complete, and about as broad as the intervals at midcosta. In a specimen of Holdsworth's from Ceylon, the bands are complete, and only about one quarter the breadth of the intervals at midcosta. The analogy of these varieties with varieties of *spiralis* and *cyanocincta* is very striking.

*Habitat*.—Shores between the Persian Gulf and Puri on the Coromandel Coast of India.

#### DISTIRA BITUBERCULATA (Peters).

*Hydrophis bituberculata*, Peters in *Mon. Berl. Acad.*, 1872, p. 855, pl. ii, fig. 2.

*Distira bituberculata*, Boulgr. in *Blanford Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 411, and *Cat.*, 1896, iii, p. 296.

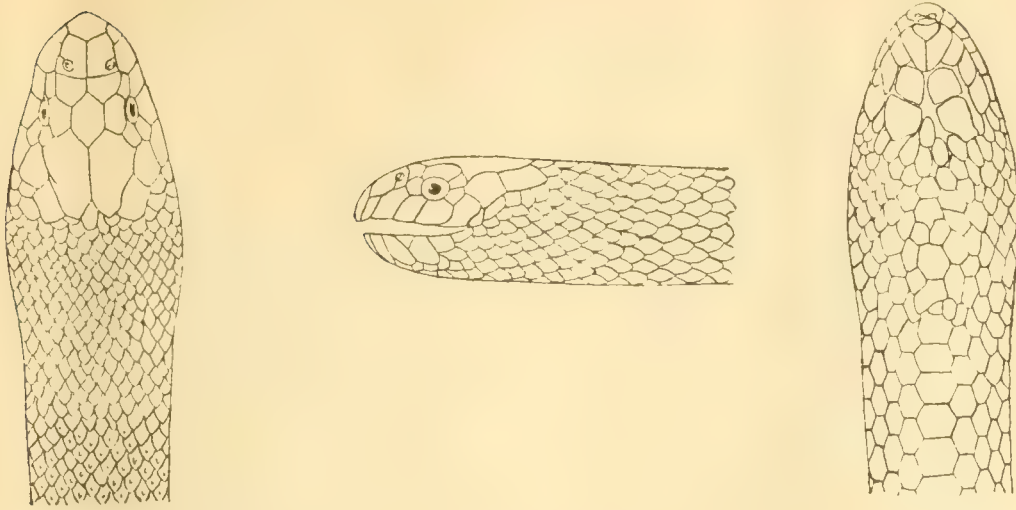


Fig. 43.—*Distira (Hydrophis) bituberculata*. After Peters, *Mon. Berl. Acad.*, pl. ii, fig 2.

This form is only known from a single example which is preserved in the Berlin Museum. As already observed by Mr. Boulenger its affinities are extremely close to *lapemoides*, and I am dubious whether it has sufficient claim to be considered distinct from this or *cyanocincta*, uniting as it does the characters of each. The difference in the number of rows anteriorly and in midbody is remarkable, *viz.* 19, a disparity beyond that seen in any other species of approximately similar corporeal habit. The greatest difference I have met with in *lapemoides* is in Fayrer's specimen from Puri now in the British Museum, and in this it amounts to 16. In the other specimens I have seen it ranges between 9 to 11. The single large anterior temporal is probably abnormal, as seen in certain specimens of *cyanocincta*, and other species in which these shields are normally small.

Not having examined the specimen I prefer to leave it as placed by Peters and Boulenger.

*Description*.—Rostral,—the portion visible above about two-thirds the internasal suture. Præfrontals,—touch no supralabial. Postoculars,—two. Temporals,—one large anterior shield, followed by another subequal shield. Supralabials,—seven, the anterior five well-developed, the third and fourth touching the eye. Infralabials,—four, the last touching three or four scales behind; the suture between the first subequal to that between the anterior sublinguals. Marginals,—one after the third infralabial. Sublinguals,—two well-developed pairs, the fellows of the posterior pair separated. Costals,—anteriorly 28, in midbody 47; imbricate posteriorly. Ventrals,—278, about twice as broad as the last costal row. Colour,—dorsally dark brown, ventrally yellowish.

*Habitat*.—Ceylon.

*DISTIRA TORQUATA* (Günther).

*Hydrophis torquatus*, Günther, *Rept. Brit. Ind.*, 1864, p. 369, pl. xxv, fig. H.

„ „ Boulgr. in Blanford, *Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 402.

„ „ Boulgr., *Cat. Brit. Mus.*, 1896, iii, p. 283.



- Hydrophis obscurus*, Boulgr. in *Blanford, Fauna Brit. Ind. Rept. and Ba'rach.*  
1890, p. 403.  
 „ „ *Sclater, List Snakes Ind. Mus.*, 1891, p. 63, Nos. 8254,  
8256 and 8262.  
 „ „ *Boulgr., Cat.*, iii, p. 284.  
 „ „ *Wall in Mem. As. Soc. Bengal*, 1906, p. 286.  
 „ *diadema*, Günther, *loc. cit.*, p. 373, pl. xxv, fig S.  
 „ *stricticollis*, Günther, *loc. cit.*, p. 376, pl. xxv, fig. R.  
 ? „ *Anderson in Proc. Zool. Soc. Lond.*, 1872, p. 397.  
 „ *Fayrer, Thanatoph. Ind.*, 1874, pl. xxviii.  
 ? „ *nigrocinctus*, Cantor, *Cat. Malay Rept.*, 1847, p. 128.  
*Distira lapemidoides*, Wall and Evans in *Journ. Bomb. Nat. Hist. Soc.*, xiii, pp.  
346 and 615.



Fig. 44.—*Distira torquata* ( $\times 2$ ).

I have examined 29 examples of this very well differentiated species. The types are in the British Museum. With them I think should be united 11 of the 13 specimens at present labelled *obscurus* in that institution. As already mentioned under *obscura* in this paper, the remaining two specimens are Russell's types of Daudin's *obscurus*, and do not accord in any way with the description given by Mr. Boulenger under that title. His description, however, fits the remaining 11 examples labelled *obscurus* which I cannot see differ in any way from Günther's *torquatus*. Reference to Mr. Boulenger's descriptions of these two species (viz., *obscurus* and *torquatus*) in his Catalogue shows the following differences: the frontal is slightly shorter in *torquatus*, and the posterior shields in contact. The first point is too trifling to consider of specific value, and as regards the chin shields, in 7 out of the 11 specimens above alluded to as labelled *obscurus*, seven have the posterior fellows in contact. I have examined the examples of each supposed species side by side, and can find no means of discriminating between them. The two should, I think without any doubt, be united and Günther's name *torquatus* retained to designate the species, as all names given prior to this are preoccupied. The posterior maxillary teeth in the type specimens labelled *torquatus* are grooved, as I find them in specimens labelled *obscurus*.

*Description*—The body anteriorly is from less than one-third to two-thirds the extreme depth behind. The former measurement is from a specimen of mine from Burma (figure 44) in which the costals are anterior 41, midbody 49, posterior 41,

juxtaposed, and ventrals 427. The latter is from another specimen of mine from the same locality in which the costals are anterior 38, midbody 48, posterior 42 juxtaposed, and ventrals 398. Rostral,—the portion visible above from half to three-fifths the internasal suture. Præfrontals,—touch the second supralabial. (This contact fails in one example on both sides, and in two others on one side). Postoculars,—one (In one example there are two on one side, and in another three on one side). Temporals,—usually one large anterior shield, and sometimes a subequal posterior one. (There are two superposed anterior on one side in two specimens, and on both sides in one). Supralabials,—seven or eight, the anterior four, five or six entire; the third and fourth touch the eye (The fifth also in at least four examples). Infralabials,—four, the last in contact with three or four scales behind, the suture between the first usually less than that between the anterior sublinguals. Marginals,—one or more after the third (sometimes the second) infralabial. Sublinguals,—two well-developed pairs, the fellows of the posterior as frequently separated as in contact. Costals,—anterior 30 to 41, midbody 37 to 54, posterior 34 to 46; subimbricate, or juxtaposed posteriorly. Ventrals,—310 to 438; mostly entire; twice or less than twice the breadth of the last costal row.

*Colour*.—Olivaceous dorsally merging to yellow ventrally. From 40 to 65 black rings surround the body, which gradually lack definition with increasing age. Some of these are interrupted costally sometimes, especially the posterior ones. At midcosta the rings are about as broad as the spaces. Head mottled above with yellow and black.

*Habitat*.—All are from coasts between the Gangetic Delta and Borneo. By far the majority of specimens are from the Burmese Coast.

#### DISTIRA CÆRULESCENS (Shaw).

*Hydrus cærulescens*, Shaw, *Zool.*, 1802, iii, 561.

*Hydrophis cærulescens*, Gray in *Zool. Misc.*, 1842, p. 62, and *Cat.*, 1849, p. 55.

„ „ *Günther, Rept. Brit. Ind.*, 1864, p. 365, pl. xxv, fig C.

„ „ *Boulgr. in Blanford, Fauna Brit. Ind. Rept and Batrach.*, 1890, p. 400

„ „ *Boulgr., Cat. Brit. Mus.*, 1896, iii, p. 275.

„ „ *Sclater, List Snakes Ind. Mus.*, 1891, p. 62.

*Hydrophis obscurus*, *Sclater, loc. cit.*, p. 63, Nos. 11498 and 11499.

„ *cyanocincta*, *Sclater, loc. cit.*, p. 66, No. 8242.

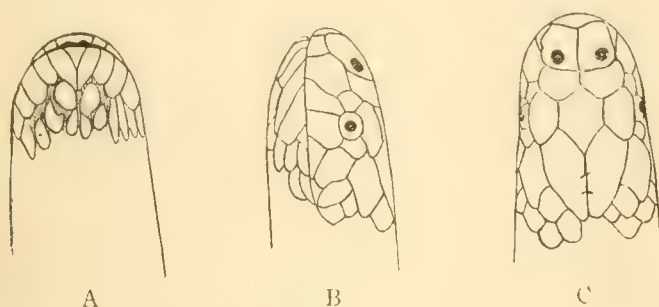


Fig. 45.—*Distira cærulescens*.



I have examined 29 of this well-differentiated species. Eleven of these which I examined in the Indian Museum, I omitted by an oversight to make any mention of in my paper on the Sea Snakes in that Institution (Mem. Asiat. Soc. Bengal, 1906, Vol. 1, No. 14).

The costals in the neck and body are unusually numerous for members of this genus, and the sublinguals are poorly developed or absent. One feature it possesses which is peculiarly its own, and in fact is only seen in one other species of the sub-family as an abnormal trait, *viz.*, in *Hydrus platurus*. This feature concerns the parietal shield which usually fails to touch the postocular. Unfortunately this is not quite constant though constant enough to prove of considerable value in assisting identification.

I find the posterior maxillary teeth are grooved.

*Description*.—The forebody is from one-third to two-thirds the extreme body depth. Rostral,—the portion visible above is about half the internasal suture. Præfrontals,—touch the second supralabial. Postoculars,—one or two, the upper not touching the parietal on one or both sides (except in five examples). Temporals,—absent, replaced by small scales, two or more being superposed anteriorly (one large anterior on one side in one specimen). Supralabials,—six to eight, the first four or five entire, the rest divided. Infralabials,—four, the last in contact with three or four scales behind; the suture between the first shorter than that between the anterior sublinguals when the latter are developed. Marginals,—one after the third infralabial. Sublinguals,—one or two pairs, one or both often ill-developed or absent, the posterior when developed usually separated (in two examples in contact). Costals,—anterior 36 to 45, midbody 42 to 53, posterior 37 to 46, imbricate or sub-imbricate anteriorly, imbricate, subimbricate, or juxtaposed posteriorly. Ventrals,—277 to 339; entire twice or rather less than twice as broad as the last costal row.

*Colour*.—Bluish, or greyish-blue, darker dorsally, surrounded with from 35 to 58 dark purplish or bluish black bands, which are as broad or broader than the interspaces at midcosta, complete in the young, but lose definition and become obscured or lost ventrally with advancing age. In some adults these are very obscure.

*Habitat*.—Coasts between Bombay and Penang.

#### DISTIRA ORNATA (Gray).

*Aturia ornata*, Gray in *Zool. Misc.*, 1842, p. 61, and *Cat.*, 1849, p. 45.

*Chitulia inornata*, Gray, *Cat.*, p. 56.

? *Hydrophis schlegelii*, Jan, *Icon. Gén.*, 1872, 40, pl. vi, fig. 1.

„ *ornata*, Günther, *Rept. Brit. Ind.*, 1864, p. 376, pl. xxv, fig. V.

„ *elliotti*, Günther, *loc. cit.*, p. 377, pl. xxv, fig. N.

? „ *striatus*, Jan, *loc. cit.*, 40, pl. v, fig. 1.

? „ *polyodontus*, Jan., *loc. cit.*, 41, pl. 1, fig. 1.

„ „ *Boulgr.*, *Cat.*, 1896, iii, p. 274.

*Distira ornata*, Boulgr. in *Blanford, Fauna Ind. Rept. and Batrach.*, 1890, p. 411

„ „ *Boulgr. Cat. Brit. Mus.*, 1896, iii, p. 290.

*Distira ornata*, Wall in *Proc. Zool. Soc. Lond.*, 1903, pp. 95 and 101.

„ „ Wall in *Mem. As. Soc. Bengal*, 1906, p. 289, and *Spol. Zeylan.*,  
August, 1907, p. 168.

„ andamanica, Annandale in *Journ. As. Soc. Bengal*, 1905, p. 194.

? *Hydrophis godeffroyi*, Peters in *Mon. Berl. Acad.*, 1872, p. 856, pl. 1, fig. 3.

„ „ Boulgr., *Cat.*, 1896, iii, p. 291.

? „ *pachycercos*, Fischer in *Abhandl. Nat. Hamb.*, iii, 1856, pl. ii, and p. 44.

„ *pachycercus*, Günther, *loc. cit.*, p. 378.

„ „ Jan, *loc. cit.*, 39, pl. vi.

„ „ Boulgr., *Cat.*, iii, p. 297.

„ *frontalis*, Boulgr., *Cat.*, iii, p. 275 (non Jan).

*Hydrophis ocellata*, Gray, *Cat.*, p. 53, in part.

„ „ Günther, *Rept. Brit. Ind.*, 1864, p. 378, in part.

*Distira ornata*, Boulgr., *Cat.*, 1896, iii, p. 290, in part.

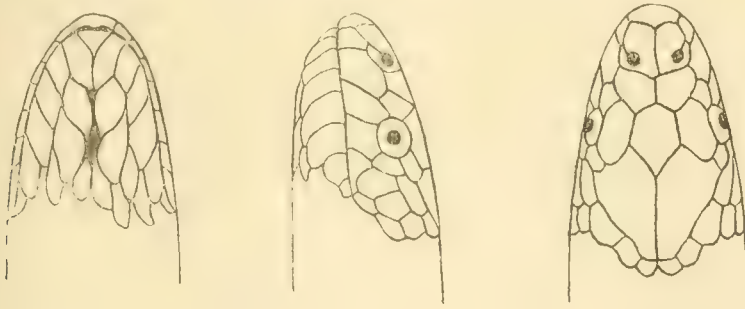


Fig. 46.—*Distira ornata* ( $\times 1\frac{1}{2}$ ).

I have examined 36 specimens exclusive of those I consider should be absorbed under this title.

It is, I consider, well marked off from the other species. Thus it is one of the few that have no marginal scales. The only other species that are so distinguished are *cantoris*, *gracilis* and *jerdoni*, all of which are too well differentiated to be confused.

One specimen referred by Mr. Boulenger to this species, *viz.*, the one presented by Lord Derby to the British Museum and originally described by Gray<sup>1</sup> as a distinct species under the name *ocellata*, has, I consider, such well marked characters, that I take the same view as Gray, supported by Günther.<sup>2</sup> I refer to it again under the title *H. ocellata*.

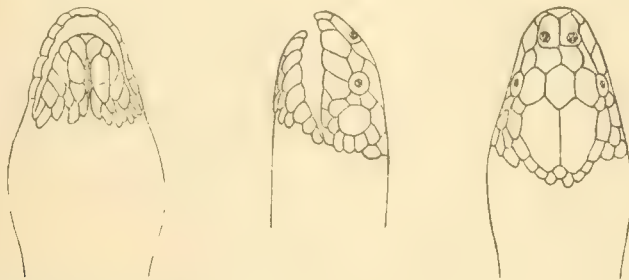


Fig. 47.—*Hydrophis godeffroyi*. After Peters, *Mon. Berl. Acad.*, 1872, pl. 1, fig. 3.

<sup>1</sup> Catalogue, 1849, p. 53.

<sup>2</sup> Rept. Brit. Ind., 1864, p. 378, plate xxv, fig. P.



I think that the *Hydrophis godeffroyi* (Peters), *H. pachycercos* (Fischer), and *H. polyodontus* (Jan) will probably prove to be specimens of this species and think the *Distira andamanica* (Annandale) which I have examined, cannot be separated.

*Hydrophis godeffroyi* was described by Peters in 1872<sup>1</sup> from two specimens. Only two other specimens are known, both of which are in the British Museum. The two latter I have examined, and cannot find to differ in any way from specimens of *ornata* in the British Museum. The only differences claimed for them by Mr. Boulenger<sup>2</sup> affect the rows of scales in the neck and body. Thus these are in *ornata* 35 to 42 in the neck 40 to 50 in the body; in *godeffroyi* 28 to 33 in the neck, and 38 to 43 in the body. I find, however, that in specimens of *ornata* in the British Museum the anterior scales vary from 31 to 39, and in the *godeffroyi* from 30 to 33. Again the scales in midbody in *ornata* vary from 36 to 45; in *godeffroyi* from 37 to 39. Examined side by side with specimens of *ornata* they seem to agree in every respect.

The description of Peters' type-specimens, one of which he figures, entirely agrees with specimens of *ornata*.

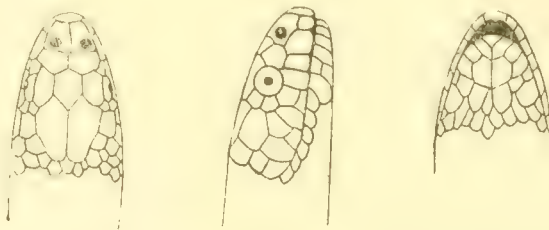


Fig. 48.—*Hydrophis pachycercos*. After Jan, *Icon Gén.* 1872, 39, pl. vi.

*Hydrophis pachycercos* was described and figured in 1856 by Fischer from a single specimen. Jan figures another specimen, and a third so named is in the British Museum. This last specimen, I have seen and consider, has every right to be called *ornata*. The differences claimed by Mr. Boulenger if one refers to his descriptions are—

*ornata*.

- (1) Head moderate.
- (2) Rostral broader than deep.
- (3) Posterior chin shields not in contact.
- (4) Neck scales 35 to 42.
- (5) Body scales 40 to 50.

*pachycercos*.

- (1) Head rather small.
- (2) Rostral as broad as deep.
- (3) Posterior chin shields in contact.
- (4) Neck scales 27 to 29.
- (5) Body scales 38 to 39.

Of these differences the first is too indefinite, and the second too minute to discuss. The third is again minute for the posterior chin shields only just touch in the British Museum specimen labelled *pachycercus*. This is, moreover, a character constant in but very few of the species. As regards neck and body scales, the differences claimed vanish when the scales are counted as I count them at definite spots in the body length, and then come within the range taken from my 36 specimens. Thus I make the range for the anterior scales in *ornata* 30 to 41, the scales in midbody 33 to 46. In *pachycercus* they are 29 anteriorly, and 39 in midbody. The British Museum

<sup>1</sup> Mon. Berl. Acad., p. 856, plate 1, fig. 3.

<sup>2</sup> Cat., 1896, vol.iii, pp. 290 and 291.

specimen agrees with Jan's in the failure of the præfrontal to meet the second labial, which must be considered an abnormal feature. The same abnormality occurs in 12 of my 36 specimens; in 4 of these, however, only on one side, the usual contact with the second labial occurring on the other. In all respects Jan's description and figure accord with *ornata*, and so apparently does Fischer's type.

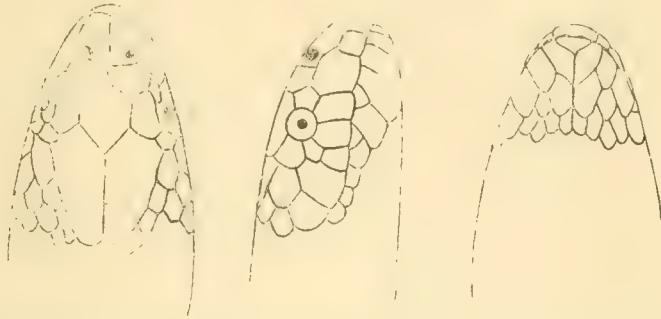


Fig. 49.—*Hydrophis polyodontus*. After Jan, *Icon. Gén.*, 1872, 41, pl. 1, fig. 1.

*Hydrophis polyodontus*.—This is only known from Jan's original specimen. The only apparent differences between this and *Distira ornata* are that it has one anterior temporal, and only one pair of chin shields. It appears to me in his figure that the lower anterior temporal is confluent with the sixth labial, and hence wanting. As regards the one pair of chin shields, in some *ornata*, the posterior pair is so small that it may be considered wanting. For instance, I think the type-specimen of *ornata* in the British Museum can hardly be said to have posterior chin shields. This poor development of the posterior pair is in consonance with what one sees in individuals of other species, for instance *jerdoni* and *cærulescens*.

*Distira andamanica*.—Only one specimen is known, which is in the Indian Museum. I have examined it, and find it accords perfectly with specimens of *ornata*. The scales in the neck and body, which Dr. Annandale thought too few, come well within the range given by my 36 specimens.

*Description*.—The neck is about half to two-thirds the extreme body depth.

The head shields are constant if one excludes the postoculars, temporals and labials.

Rostral,—portion visible above from about half to three-fifths the internasal suture. Præfrontals,—touch the second supralabial (12 exceptions, and in four of these on one side only). Postoculars,—two (three in six examples, and in three of these on one side only). Temporals,—usually broken up, two or three superposed scales occurring anteriorly (in five examples a well-developed single anterior shield, in two of these on one side only). Supralabials,—seven or eight, the first three entire, but any or all of the rest may be divided; the third and fourth, third, fourth and fifth, or fourth, fifth and sixth may touch the eye. Infralabials,—four, the last in contact with three or four scales behind, the suture between the first usually less than that between the anterior sublinguals. Marginals,—none (one after the third on one or both sides in three examples only). Sublinguals,—two well-developed pairs, the posterior fellows separated, or the posterior pair ill-



developed or absent. Costals, —anterior 29 to 41, midbody 33 to 46, posterior 28 to 42, feebly imbricate anteriorly, feebly imbricate or juxtaposed posteriorly. Ventrals, —227 to 300, entire or a few divided posteriorly, about twice or less than twice the breadth of the last costal row.

*Habitat*.—From the Persian Gulf to Australia and as far north as the Loo Choo Islands and Japan.

*Colour*.—The adornment of this species is very diversified, and at least six well defined varieties may be met with.

- (1) Completely banded. This is seen more often in young specimens, but in rare instances, the bands are preserved towards or into adult life. Figure 51 furnishes a good illustration from the specimen presented by me to the British Museum. It was collected by Mr. Owston in the Loo Choo Islands. The specimens of *godeffroyi* (Boulenger) in the British Museum which I cannot separate from *ornata* are very similar. The bands taper ventrally, are complete anteriorly, but incomplete ventrally in the hinder part of the body. A specimen from Karwar in the Bombay collection has dorsal bars anteriorly, and nearly complete tapering annuli behind. This form is analogous to variety (1) of *viperina*.
- (2) *Forma typica* (Gray). Dorsum beset with blackish bars which are discrete, and broader than the intervals. Much the commonest variety in adults and young. The specimens of *pachycercus* in our National Collection which I cannot distinguish from *ornata* are much the same, but the bars are less distinct. It is analogous with the *forma typica* of *viperina*.
- (3) Like the last but the dorsal bars modified into rhombs, the angles of many of which may be confluent vertebally. *Polyodonta* (Jan) which I regard as merely a variety of *ornata* is a good example. It is very analogous to var. (3) of *viperina*.
- (4) Dorsum ornamented as in "*forma typica*," and the costal region with a single, more or less complete, series of large spots or bars alternating with the dorsal series. It is not uncommon, Jerdon's example in the British Museum (Fig. 50) is an excellent illustration. It is from Madras. A specimen in the Colombo Museum (No. 127) is presumably of local origin. A young specimen in the Indian Museum presented by Captain Lloyd, I.M.S., is from Sandaway Island on the Burmese coast. In this the costal spots are smaller than in the other examples. Of this variety is, also, I consider, *frontalis* (Boulenger, non Jan). It is very comparable to var. *subcincta* of *spiralis*.
- (5) *inornata* (Gray). The whole dorsum black as though all the dorsal bars of "*forma typica*" had become confluent. The band so produced occupies the upper two-fifths or half of the body depth, and is sharply defined, reminding one of the colour disposition of the common variety of *Hydrus platurus*. It is a rare form. The type, viz. *inornata* (Gray), is

from the Indian Ocean, and another specimen also in the British Museum is Kempe's from India, the exact locality not known. This form is very comparable to var. *jayakari* of *viperina* and var. *phipsoni* of *cyanocincta*.

- (6) Ornamented with many ocelli of very variable size and capricious distribution, the largest occurring for the most part dorsally. This form is only known from Australia, and has been confused with *ocellata* (Günther) which latter is very similar in coloration, but I consider it a very distinct species. It deserves the name *pseudocellata*. I think it very analogous to the variety *elegans* of *cyanocincta*.

#### DISTIRA OCELLATA (Gray).

*Hydrophis ocellata*, Gray, *Cat.*, p. 53, in part.

„ „ „ „ Günther, *Rept. Brit. Ind.*, 1864, p. 378, pl. xxv, P., in part.

*Distira ornata*, Boulgr. in Blanford, *Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 411, in part.

„ „ „ „ Boulgr. *Cat.*, 1896, iii, p. 290, in part.



Fig. 53.—*Distira ocellata*. After Günther's figure of the type specimen, *Rept. Brit. Ind.*, pl. xxv, fig. P.

I cannot accept *in toto* the view held by Mr. Boulenger in uniting *ocellata* (Gray) with *ornata* (Gray). So far as the type-specimen of *ocellata* is concerned I find the rows of costals much greater than in the other specimens so named, and they exceed by 12 the outside limits given by my series of 36 examples of *ornata* at midbody.

The difference is enormous. My view regarding the type-specimen of *ocellata* supports that previously held by Gray and Günther.

The other specimens referred by Gray and Günther to *ocellata* I consider distinct, and I agree with Mr. Boulenger that they are but colour varieties of *ornata* (Gray).

The species *ocellata* thus rests on a single specimen which is in the British Museum.

*Description*.—The neck is about half the extreme body depth.

Rostral,—the portion visible above is rather more than half the suture between the nasals. Præfrontals,—touch the second labial. Postoculars,—two. Temporals,—two, ill-developed, superposed scales anteriorly, the lower reaching the labial border. Labials,—six; (if the lower temporal is not considered as such) the third and fourth touching the eye. Infralabials,—five, the fourth largest, and in contact with the fifth, and one small scale behind; the suture between the first pair subequal to that between the anterior sublinguals. Marginals,—none. Sub-



linguals,—two pairs, the posterior ill-developed and separated. Costals,—anterior 45, midbody 58, posterior 56; imbricate anteriorly, juxtaposed posteriorly. Ventrals,—290; entire and nearly twice the breadth of the last costal row throughout. Colour,—yellowish with 31 black broad dorsal bars, alternating with narrow bars, all rounded laterally. Several series of round spots costally very variable in size, and capricious in distribution.

*Habitat*.—Australia.

*DISTIRA MAJOR* (Shaw).

*Hydrus major*, *Shaw, Zool.*, 1802, iii, p. 558, pl. cxxiv, in part.

*Disteira doliata*, *Günther, Rept. Brit. Ind.*, 1864, p. 359.

*Hydrophis mentalis*, *Gray in Zool. Misc.*, 1842, p. 62, and *Cat.* 1849, p. 53.

? *Disteira dumerilii*, *Jan, Icon. Gén.*, 1872, 39, pl. iv.

*Hydrophis major*, *Günther, loc. cit.*, p. 363, pl. xxv, fig. G.

*Distira major*, *Boulgr. in Blanford, Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 407, and *Cat. Brit. Mus.*, 1896, iii, p. 289.

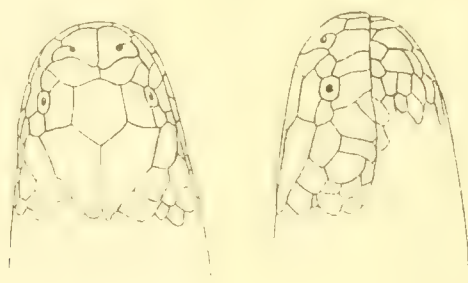


Fig. 54. - *Distira major*. After Günther, *Rept. Brit. Ind.*, 1864, pl. xxv, fig. G.

The only specimens I have seen are the five in the British Museum. In many respects the species shows close affinities with *Astrotia stokesi*.

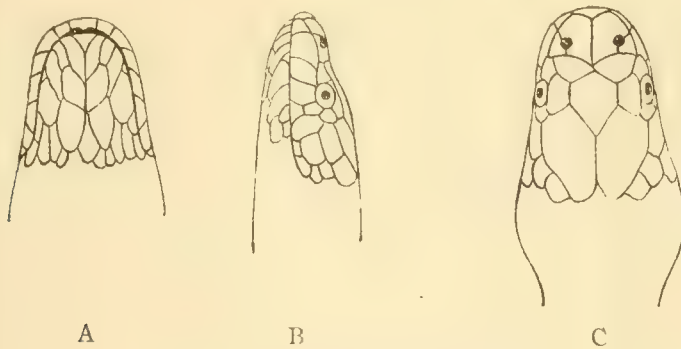
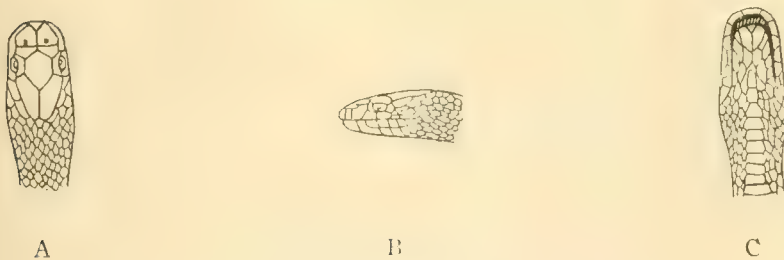
*Description*.—Body anteriorly more than half the extreme depth posteriorly.

Rostral,—the portion visible above about half the internasal suture. Prefrontals,—touch the second supralabial. Postoculars,—two. (One on one side in one example, and on both sides in one). Temporals,—two small superposed scales anteriorly. Supralabials,—eight or nine, the first four entire, the rest variously divided; the third and fourth touch the eye. Infralabials,—four, the last in contact with three or four scales behind; the suture between the first about equal to that between the anterior sublinguals. Marginals,—a complete row after the third infralabial. Sublinguals,—usually two pairs, the posterior fellows separated. Sometimes one or both poorly developed. Costals,—anterior 31 to 35, midbody 33 to 42, posterior 34 to 39; imbricate everywhere. Ventrals,—233 to 250 (200 to 236, Boulenger). Mostly entire or many divided posteriorly; rather less than twice as broad as the last costal row. Colour,—yellowish ventrally with from 26 to 30 dorsal bars and sometimes an intermediate line: sometimes a series of costal spots, alternate with the bars.

*Habitat*.—With the exception of one from the Indian Ocean all are from Australia

## DISTIRA VIPERINA (Schmidt).

- ? *Hydrophis obscurus*, Jan, *Icon. Gén.*, 1872, 40, pl. vi, fig 2 (non Daud.).  
 „ *viperina*, Günther, *Rept. Brit. Ind.*, 1864, p. 378.  
*Distira viperina*, Boulgr. in *Blanford, Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 413.  
 „ „ *Boulgr., Cat. Brit. Mus.*, 1896, iii, p. 298.  
 „ „ *Sclater, List Snakes Ind. Mus.*, 1891, p. 66.  
 „ „ *Wall in Proc. Zool. Soc. Lond.*, 1903, p. 96, and in *Mem. As. Soc. Bengal*, 1906, p. 292.  
*Hydrophis jayakari*, Boulgr. in *Ann. and Mag. Nat. Hist.*, 1887 (5), xx p. 408.  
 „ *nigra*, Anderson in *Proc. Zool. Soc. Lond.*, 1872, p. 399.  
 „ „ *Fayrer, Thanatoph. Ind.*, 1874, pl. xxv.  
 „ „ *Ewart, Pois. Snakes Ind.*, 1878, pl. 19, fig. 1.  
 „ „ *Boulgr., Cat. Brit. Mus.*, 1896, iii, p. 274.  
*Distira lapemidoides*, *Sclater, loc. cit.*, p. 66. No. 8269.

Fig. 55.—*Distira viperina*.Fig. 56.—*Distira (Hydrophis) nigra* (Anderson). After Fayrer, *Thanatoph. Ind.*, pl. xxv.

I have examined 21 specimens. No *Hydrophid* with the exception of *jerdoni* presents such well-marked characters to differentiate it from the rest of this genus. It has at least two shields with characters peculiar to itself, and so pronounced that either will suffice to declare its identity. These are the frontal and the anterior ventrals.

In all the other species of this genus the frontal equals, or is rather greater in breadth than, the supraoculars. In *viperina* it is at least twice as broad (often three



times). Again in all the other species the sutures made by the frontal with its contiguous shields are subequal, or the fronto-parietal sutures are rather the longest. In *viperina* the fronto-supraocular sutures are the shortest, and only half as long as the fronto-parietals. The anterior ventrals in all the other species are barely twice as broad as the last costal row. In this they are four times as broad or broader. I think it extremely probable that osteological peculiarities will be found justifying its separation from this genus and the creation of a genus apart.

*Hydrophis nigra*. This is known from a solitary specimen which is now in the British Museum. It was originally described by Anderson,<sup>1</sup> and subsequently figured by Fayrer.<sup>2</sup> It has the peculiar frontal and anterior ventrals typical of *viperina* and agrees with this species in all other respects except colour, being black throughout. (The specimen is now shrivelled, and the detail of some of the head shields in consequence no longer discernible with certainty. Where I have had any doubt, however, reference to Anderson's description from the fresh specimen has cleared it up).

I reproduce Fayrer's figures of this snake. From an artistic point of view the figures leave much to be desired, but the two most important and clinching characteristics of *viperina* (Schmidt) are well shown, and to my mind can leave no possible doubt that the specimen is a melano-*viperina*.

*Description*.—The neck is about half to three-fourths the extreme body depth. Some of the head shields are very irregular in individuals, notably the postoculars, temporals, supralabials, and posterior chin shields. Rostral,—the portion visible above is about half (sometimes rather more or less) the suture between the nasals. Præfrontals,—touch no supralabial. Frontal,—twice to three times the breadth of the supraoculars. Fronto-parietal sutures twice as long as the fronto-supraoculars. Postoculars,—two usually (in four examples one). Temporals,—very irregular, and usually broken up. (In four examples a fairly well-developed anterior shield). Supralabials,—subject to much variation. Sometimes 7, 8, or 9. Often one or more of these shields from the third backwards divided. The third and fourth, third, fourth and fifth, or fourth and fifth touch the eye. Infralabials,—four, the last in contact with three or four scales behind; the suture between the first, equal to or greater than that between the anterior sublinguals. Marginals,—one usually after the third infralabial (sometimes two). Sublinguals,—two fairly well-developed shields, the fellows of each in contact. (In five examples the posterior separated). Costals,—anterior 27 to 34 (usually 27 to 31), midbody 39 to 50 (usually 39 to 46), posterior 35 to 45; imbricate anteriorly, juxtaposed posteriorly. Ventrals,—235 to 267. Entire throughout, anteriorly four or five times, midbody and posteriorly barely twice as broad as the last costal row.

*Habitat*.—Persian Gulf to South China. It is remarkable that though not an uncommon species, no specimen that I have seen has come from the Malayan Archipelago.

*Colour*.—This is very variable. Most specimens are adorned with from 26 to 37 dorsal bars or complete bands. I group the varieties as follows:—

<sup>1</sup> Proc. Zool. Soc. London, 1872, p. 390.

<sup>2</sup> Thanatoph. Ind., 1874, plate xxv.

(1) Completely banded. This is an unusual form seen generally in young specimens. Jerdon's example in the British Museum from Madras affords a good illustration. Another such is No. 8277 in the Indian Museum from Puri. I have seen one other in the Bombay Society's collection from Karwar. Some of the bands are frequently confluent vertebally.

It is analogous to var. (1) of *ornata*.

A young specimen in the Indian Museum, No. 8274, is intermediate between this and the next form. It has dorsal bars anteriorly, and complete bands posteriorly.

(2) *Forma typica* (Schmidt). With black dorsal bars, sometimes confluent vertebally. This is one of the commonest forms, and very comparable to the *forma typica* of *ornata*.

(3) Like the last but the bars modified into rhombs, the angles of which are very prone to vertebral confluence. It is one of the commonest varieties. I have seen specimens from Karachi, Malabar, and Swatow in South China. (The last in the City Hall Museum, Hong-Kong, No. 2, labelled *Hydrus major*).

It is analogous to var. (3) of *ornata*.

(4) *jayakari* (Boulenger). The whole dorsum black as from a confluence of the bars seen in *forma typica*. The band thus produced sharply defined costally. Two such examples are in the British Museum including the type which is from Muscat. The other is from the Indian Ocean. A similar specimen in the Indian Museum (No. 8276) is from Puri. A somewhat modified form is that from Bombay presented to the British Museum by Mr. Phipson in which very indistinct bars can be discerned across the dorsal band. This variety is analogous to variety *phipsoni* of *cyanocincta*, and *inornata* of *ornata*.

(5) *nigra* (Anderson). This is known from a unique example now in the British Museum, which is young and completely black. It should be considered a melanotic freak, but it is convenient to tabulate it here as a colour variety. It is from Puri.

#### DISTIRA JERDONI (Gray).

"Shiddil," *Russell, Ind. Serp.*, 1801, ii, pl. xii.

? *Hydrus nigrocinctus*, *Cantor, Cat. Malay Rept.*, 1847, p. 129, pl. xl, fig. 8 (nec Daudin, nec Jan).

*Kerilia jerdonii*, *Gray, Cat.*, 1849, p. 57.

*Hydrophis jerdonii*, *Günther, Rept. Brit. Ind.*, 1864, p. 362, pl. xxv, fig. B.

„ „ *Fayrer, Thanatoph. Ind.*, 1874, pl. xx.

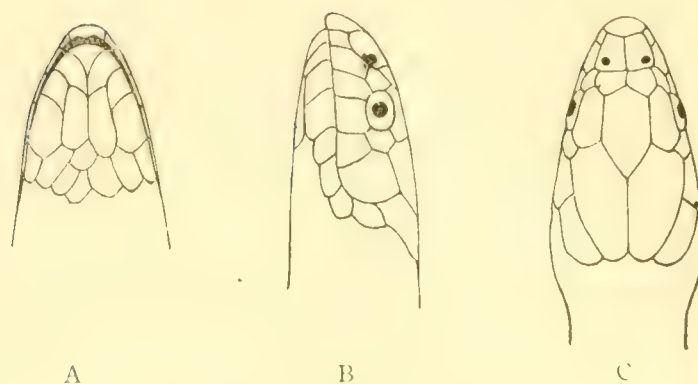
„ „ *Ewart, Poisonous Snakes Ind.*, 1878, pl. 14.

*Distira jerdonii*, *Boulgr. in Blanford, Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 408, and *Cat. Brit. Mus.*, 1896, iii, p. 299.

„ „ *Sclater, List Snakes Ind. Mus.*, 1891, p. 65.

„ „ *Wall in Mem. As. Soc. Bengal*, 1906, p. 293, and in *Spol. Zeylan.*, August, 1907, p. 171.



Fig. 58.—*Distira jerdoni* ( $\times 2$ ).

I believe Mr. Boulenger is in error in supposing Jerdon's specimen in the British Museum the type (*vide* Catalogue, 1896, vol iii, p. 299). A specimen of this species (No. 528) in the Royal College of Surgeons' Museum, London, collected by Russell, on comparison with Russell's plate xii (Ind. Serp., vol. ii, 1801) leaves little doubt in my mind is the original of the figure, and if my conviction is correct should be acknowledged the type.

I have examined 17 examples. It is so very well differentiated from all the other species in the subfamily, and those of the genus to which it has been attached, that it is one of the few snakes that has not been confused with other forms. The costal rows (19 to 21) are fewer than in any other species of this genus. The infralabials being three only are absolutely distinctive, and so is the peculiar turtle-like snout. The descent of the large anterior temporal to the labial border is only seen in aberrant examples of two or three other species.

*Description*.—Body anteriorly from about one-half to two-thirds the greatest depth posteriorly.

*Rostral*,—the portion visible above is from three quarters, to equal to the internasal suture. *Præfrontals*,—touch no supralabial. (In one they touch the second on one side, and in another on both sides). *Postoculars*,—one (two in four examples, three of which on one side only). *Temporals*,—confluent with sixth supralabial to form a large shield. Often succeeded by another subequal shield. *Supralabials*,—five anterior to the temporo-labial, the third and fourth touching the eye. *Infralabials*,—three, the last touching two scales only behind, only the first two in contact with the anterior sublinguals; the suture between the first subequal to or rather shorter than that between the anterior sublinguals. *Marginals*,—none. *Sublinguals*,—two rather poorly developed pairs, or only an anterior pair. Sometimes a confluence between the anterior and posterior on one or both sides occurs. *Costals*,—anterior 17 (16 in one, 18 in two examples), midbody 19 to 21, posterior 19 to 21; imbricate throughout. *Ventrals*,—219 to 248 entire everywhere, twice or hardly twice the breadth of the last costal row.

*Colour*.—Olivaceous dorsally, yellowish ventrally. Surrounded by 31 to 41 black bands, with usually an intermediate black spot or bar dorsally. In old specimens the bands may become obscured ventrally, and be converted into bars. In a specimen in

the British Museum, the præocular is confluent with the præfrontal on both sides. In another I obtained from Madras the præfrontals fail to meet one another owing to the forward projection frontal.

*Habitat*.—All were captured along the shores between Ceylon and Penang.

## ACALYPTUS.

### ACALYPTUS PERONI (Duméril et Bibron).

*Acalyptus superciliosus*—

vel *peroni*, *Duméril et Bibron, Erp. Gen. Hist. Nat.*, vii, p. 1340.

*Acalyptus peronii*, *Duméril in Mem. Acad. Sc. Paris*, 1853, xxiii, p. 522.

*Acalyptophis superciliosus*, *Günther, Rept. Brit. Ind.*, 1864, p. 359.

„ „ *Jan, Icon. Gén.*, 1872, 40, pl. ii, fig. 2.

„ *peronii*, *Boulgr., Cat.*, iii, 1896, p. 269.

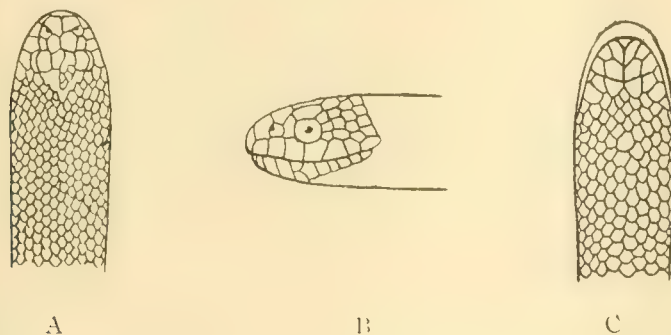


Fig. 59.—*Acalyptus (superciliosus) peroni*. After Jan, *Icon. Gén.*, 40, pl. ii, fig. 2.

I have examined three specimens only, all in the British Museum. The two examples presented by Dr. Günther, and the Earl of Crawford appear to me alike, but that presented by Dr. Fischer will, I think, prove to be a species apart. In the last named the costals are 19 anteriorly, 24 in midbody, and 23 posteriorly. The ventrals 156, and narrower than the last costal row. On the other hand the two former have 23 costal rows anteriorly, and 29 in the mid and posterior parts of the body. The ventrals are 195? and 209, and about as broad as the last costal row. Fischer's specimen is from Hong-Kong. The habitat of Günther's is unknown, and the Earl of Crawford's is from Torres Straits. I think Fischer's specimen should be given specific rank, but there being only one specimen I prefer to follow Mr. Boulenger's ruling in the matter.

*Description*.—The head shields are studded with asperities.

*Rostrals*,—in contact with four shields, the portion visible above about two-thirds the internasal suture. *Præfrontals*,—touch no supralabial. *Frontals*,—broken up. *Parietals*,—broken up. *Nasals*,—touch the first and second supralabials; nostril in the nasal shield, a suture runs from it to the præfrontal, and another to the second supralabial, so that the shield is divided into two parts. The detached fragment, however, is obviously a part of the nasal, and not a separate shield. A similar condition



is met with in individuals of many other hydrophids, viz., *Enhydrina valakadyn*, *Enhydris hardwickii*, *Distira ornata*, *D. viperina*, *D. nigrocincta*, and others. Præocular, —one. Postoculars, —three. Temporals, —many, small, and scale-like. Supralabials, —seven, the anterior five entire and well-developed, the rest small; the third and fourth touch the eye. Infralabials, —four, the fourth divided, the last in contact with two scales behind. Marginals, —one or more after the third infralabial. Sublinguals, —two well-developed pairs, the fellows of each in contact. Costals, —anterior 19 to 23, midbody 24 to 29, posterior 23 to 29; subimbricate. Ventrals, —156 to 200 about as broad, or narrower than the last costal row.

*Colour*.—Yellowish-grey with a series of dorsal black cross-bars, tapering subcostally, and a series of ventral bars alternating with the above.

*Habitat*.—Torres Straits, Hong-Kong.

## THALASSOPHIS.

### THALASSOPHIS ANOMALUS (Schmidt).

*Thalassophis anomalus*, Schmidt in *Abhandl. Nat. Hamb.*, 1852, ii, p. 81, pl. iv.

„ „ „ *Boulgr., Cat.*, iii, 1896, p. 269.

*Hydrophis anomala*, Günther, *Rept. Brit. Ind.*, 1864, p. 379.

? „ „ „ *Jan, Icon. Gén.*, 1872, 40, pl. iv, fig. 1.

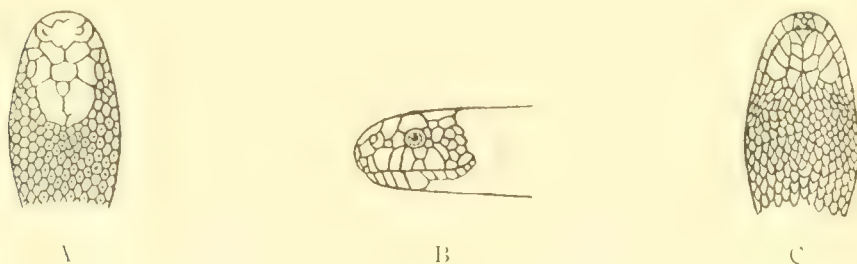


Fig. 60.—*Thalassophis anomalus*. After Jan, *Icon. Gén.*, 40, pl. iv, fig. 1

I have seen no specimen.

*Description*.—Rostral, —broken up. Internasals, —narrow, longer than the præfrontals. Personally I regard these as detached fragments of the nasals which in this species like other head shields are prone to subdivision. (In Jan's figure confluent with the nasals). Præfrontals, —four? in one transverse series, the outer not in contact with any supralabial. Frontal, —entire? (divided transversely in Jan's figure). Supraoculars, —entire. Parietals, —entire (showing a tendency to disintegration in Jan's figure). Nasals, —lateral; in contact with the first three supralabials. Præoculars, —one. Postoculars, —two. Temporals, —two or three, small, scale-like. Supralabial, —seven to nine, showing a tendency to subdivision (in Jan's figure the first and sixth are horizontally divided); the fourth, fifth and sixth touching the eye. Infralabials, —the fourth is the largest of the series, and in contact with four scales behind. Marginals, —absent. Sublinguals,

—two small pairs, the posterior quite separated by scales. Costals,—31 to 33 in midbody; juxtaposed, strongly tubercular. Ventrals,—small, subequal or smaller than the last costal row.

*Colour*.—Yellowish with dark annuli dilated vertebrally.

*Habitat*.—Java.

THALASSOPHIS? ANNANDALEI (Laidlaw).

*Distira annandalei*, Laidlaw in *Proc. Zool. Soc. Lond.*, 1901, vol. ii, p. 579, and figure.

„ „ *Boulgr., Fasc. Malay Zool.*, 1903, pt. 1, p. 166.

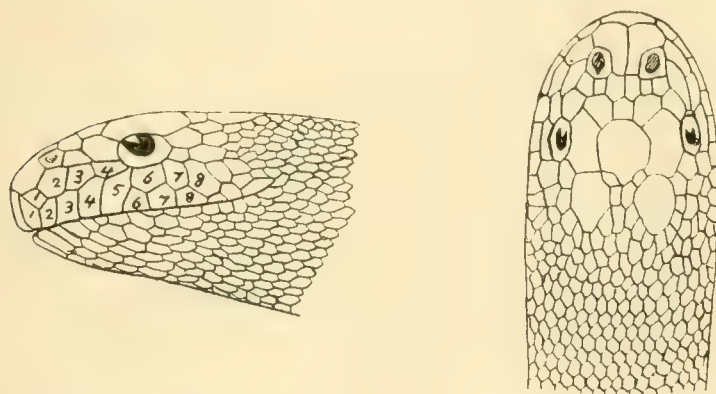


Fig. 60a. *Thalassophis annandalei*,  $\times 2$ . After Laidlaw, in *Proc. Zool. Soc.*, vol. ii, 1901.

I have not seen a specimen.

*Description*.—Rostral,—not broken up. ? Internasals,—broad in front, narrowed behind, separating the nasals. Præfrontals,—many arranged in two transverse series. Frontal,—more or less broken up behind, and thus separated by detached fragments from the parietals. Parietals,—irregular; an isolated part surrounded by small scales apparently derived from peripheral disintegration. Nostrils placed in single small scales which appear to be derived from the large shields anterior to them, designated herein as internasals. Analogy seems to indicate that the internasals so called herein should be considered nasals. Præoculars,—one. Postoculars,—two. Temporals,—three, small, hardly deserving recognition as such. Supralabials—9 to 12, all subject to division. (I have numbered these shields in the annexed figure as I consider they should be regarded), the 4th to the 7th may touch the eye. Sublinguals,—one pair present, entire, or divided. Infra-labials,—apparently irregular. Costals,—about 76 rows round the neck, 90 to 100 at midbody, juxtaposed, more or less tuberculate. Ventrals,—barely enlarged, 350 to 370.

*Colour*.—Pale greyish-olive above, white below; back with dark cross-bars, narrower than the interspaces, tapering to a point on the sides.

*Habitat*.—Malay Peninsula (Patani).



## ENHYDRIS.

*Key to the species of Enhydris.*

- (A) Parietals broken up; suture from nostril to second labial .. *curtus*.  
 (B) Parietals entire; suture from nostril to first labial .. *hardwickii*.

## ENHYDRIS CURTUS (Shaw).

*Hydrus curtus*, Shaw, *Zool.*, 1802, iii, p. 562.

*Lapemis curtus*, Gray in *Zool. Misc.*, 1842, p. 60, and *Cat.*, 1849, p. 44.

*Hydrophis curta*, Günther, *Rept. Brit. Ind.*, 1864, p. 379.

„ „ *Stoliczka in Proc. As. Soc. Bengal*, 1872, p. 91

„ „ *Fayrer, Thanatoph. Ind.*, 1874, pl. xxiv.

„ *propinquus*, Jan., *Icon. Gén.*, 1872, 41, pl. i, fig. 2.

*Enhydris curtus*, Boulgr. in *Blanford, Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 396, and *Cat.*, iii, 1896, p. 300.

„ „ *Sclater, List Snakes Ind. Mus.*, 1891, p. 62.

„ „ *Wall in Jour. Bomb. Nat. Hist. Soc.*, xvi, p. 310, and in *Spol. Zeylan.*, August 1907, p. 172.

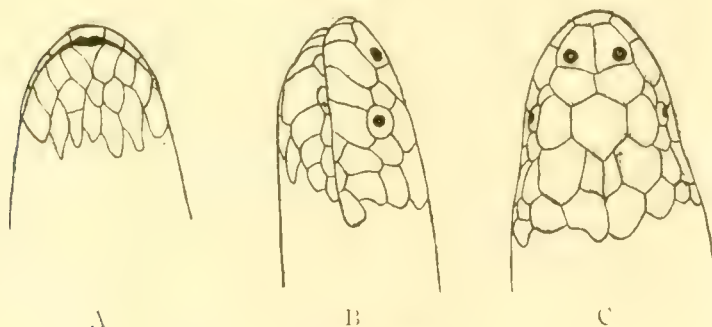


Fig. 61.—*Enhydris curtus* ( $\times 1\frac{1}{2}$ ).

I have examined in detail 21 examples of this species, which is very common around the Coasts of India. On the Malabar Coast it was the commonest sea snake after *Enhydrina valakadyn*.

It is a very easy species to recognise. It shares with *E. hardwickii* alone the peculiar enlargement of the lowest three or four costal rows. The completely broken up condition of the parietals is only seen in the genus *Acalyptus* among the Hydrophiinae with this one exception.

*Description*.—Rostral,—touches four shields; the portion visible above is one-third or less than one-third the length of the internasal suture. Præfrontals,—touch the second supralabial (the third also in one, no supralabial in one example). Frontal,—entire. Parietals,—broken up; very frequently into three, sometimes more parts, which, however, taken together preserve the contour of these shields as seen in other species of the family.<sup>1</sup> Nasals,—touch the first and second supra-

<sup>1</sup> One exception No. 11531 in Indian Museum where they are entire.

labials; a suture runs from the nostril to the second supralabial (in three examples to the first). Præoculars,—one. Postoculars,—one or two. Temporals,—two or three small shields. Supralabials,—seven usually, sometimes eight; the third and fourth usually touch the eye (sometimes the fifth also, rarely the fourth only). Infralabials,—the fourth is the largest of the series, and in contact with three or four scales behind. Marginals,—a more or less complete row after the second infralabial. Sublinguals,—poorly developed, often so small, they hardly deserve the name. The anterior and posterior fellows are widely separated. Costals,—anteriorly 29 to 36, midbody 30 to 45, posteriorly 31 to 42; juxtaposed everywhere; the lowest three or four rows distinctly enlarged, and in many males the tubercles are remarkably spinose. Ventrals,—151 to 219, ill-developed except anteriorly.

*Colour*.—Olivaceous with dark, ill-defined dorsal transverse bars, as wide or wider than the interspaces.

*Habitat*.—Coasts from the Persian Gulf to Borneo.

The post-maxillary teeth are grooved.

#### *ENHYDRIS HARDWICKII* (Gray).

*Lapemis hardwickii*, Gray, *Ill. Ind. Zool.*, 1834, ii, pl. lxxxvii, f. 2, and *Cat.*, 1849, p. 44.

„ *loreatus*, Gray in *Ann. Mag. Nat. Hist.*, 1843, xi, p. 46.

„ *loreata*, Günther, *Rept. Brit. Ind.*, 1864, p. 380.

*Hydrophis pelamidoides*, Jan, *Icon. Gén.*, 1872, 41, pl. iii, fig. 1.

„ *abbreviatus*, Jan, *loc. cit.*, 40, pl. iv, fig. 2, and v, fig. 2.

„ *fayreriana*, Anderson in *Journ. As. Soc. Bengal*, 1871, p. 19.

*Enhydris hardwickii*, Günther, *Rept. Brit. Ind.*, 1864, p. 380, pl. xxv, fig. W; Boulgr. in *Blanford, Fauna Ind. Rept. and Batrach.*, 1890, p. 397, and *Cat.*, iii, 1896, p. 301.

„ „ *Sclater, List Snakes, Ind. Mus.*, 1891, p. 62.

„ „ *Wall in Proc. Zool. Soc. Lond.*, 1903, p. 96.



Fig. 62.—*Enhydris* (*Hydrophis*) *hardwickii*. After Günther, *Rept. Brit. Ind.*, 1864, pl. xxv, fig. 4.

I have examined at least 22 examples. It is an easy snake to recognise. One feature requires special mention as being almost peculiar to itself, *i.e.*, suture runs from the nostril to the first supralabial. I have seen but two exceptions, and it is a feature I have only seen in a few aberrant examples of *E. curtus* and *Distira ornata* among all



the species of this family, the suture when present running to the second supralabial. The ventrals are very small and few, and the costals are juxtaposed everywhere.

*Description*.—Rostral,—touches four shields, the portion visible above is about one-third, or less than one-third the internasal suture. Præfrontals,—touch the second supralabial. Frontal,—entire, touches six shields; the fronto-parietal sutures are longest, the fronto-præfrontal shortest. Parietals,—entire. Nasals,—touch the first and second supralabials, a suture from the nostril runs to the first supralabial; sometimes other sutures radiating from the nostril divide this shield into two or three segments, one of which may resemble a loreal (hence the *loreata* of Gray and Günther). Præoculars,—one. Postoculars,—one, two, or three. Temporals,—two, three, or four small superposed shields. Supralabials,—seven or eight, the third and fourth usually touch the eye (rarely the fourth or fifth only, or the third and fifth). Infralabials,—the fourth is the largest of the series, and in contact with three or four scales behind. Marginals,—a more or less complete row behind the second infralabial. Sublinguals,—small or absent. Costals,—anteriorly 26 to 32, midbody 27 to 37, posteriorly 27 to 34; juxtaposed everywhere; the lowest three or four rows enlarged. Ventrals,—130 to 200, smaller than the last costal row.

*Colour*.—Olivaceous-grey or yellowish with distinct though ill-defined blackish bands, or dorsal bars, the latter often confluent vertically.

*Habitat*.—The Coromandel Coast of India (Puri), through the Ma'ayan Archipelago to New Guinea. It is rare in the Bay of Bengal, but appears to be not uncommon about the Philippines.

The post-maxillary teeth are grooved.

## HYDRUS.

### HYDRUS PLATURUS (Linnæus).

*Anguis platyura*, Linn., *Sys. Nat.*, 1766, i, p. 391.

"Nalla Wahlagillee pam," Russell, *Ind. Serp.*, 1796, i, pl. xli.

*Pelamis bicolor*, Daudin, *Rept.*, 1803, vii, p. 366, pl. lxxxix.

"", Gray, *Cat.*, 1849, p. 41.

"", Günther, *Rept. Brit. Ind.*, 1864, p. 382.

"", Fayrer, *Thanatoph. Ind.*, 1874, pl. xvii.

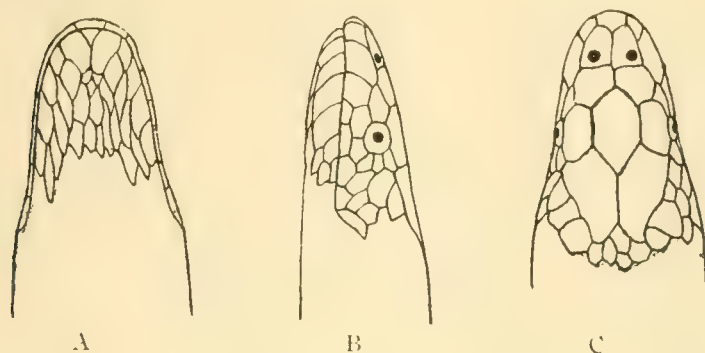
"", *ornata*, Gray, *Cat.*, 1849, p. 43.

*Hydrophis bicolor*, Jan, *Icon. Gén.*, 1872, 40, pls. ii and iii.

*Hydrus platyrus*, Boulgr. in Blanford, *Fauna Ind. Rept. and Batrach.*, 1890, p. 397, and *Cat.*, iii, 1896, p. 267.

"", Slater, *List Snakes Ind. Mus.*, 1891, p. 62.

"", Wall in *Proc. Zool. Soc. Lond.*, 1903, pp. 95 and 101, and in *Journ. Bomb. Nat. Hist. Soc.*, xvi, p. 310, and in *Spol. Zeylan.*, August 1907, p. 166.

Fig. 64.—*Hydrus platurus*.

I have examined 47 specimens besides those in the British Museum. I find the posterior maxillary teeth grooved.

*Description*.—Rostral,—the visible portion above one quarter to one half the internasal suture. Præfrontals,—touch the second supralabial (rarely the third also). Frontal,—sutures subequal, or the fronto-supraocular rather the longest. Postoculars,—one or two. Temporals,—absent, replaced by small scales. Supralabials,—seven to ten very irregular, the third and succeeding shields very frequently divided, two sometimes three touch the eye, *viz.*, the third, fourth or fifth. Infralabials,—five or six, the last in contact with three or four scales behind. Marginals,—none. Sublinguals,—small, an anterior pair usually more or less distinct, but widely separated, a posterior pair still less distinct if recognisable at all as such. Costals,—anterior 40 to 54, midbody 45 to 62, posterior 41 to 52 juxtaposed everywhere. Ventrals,—370 to 440, small but rather larger than the last costal row, very irregular, many being divided.

*Colour*.—Vary variable. I quote from Boulenger's Catalogue (1896).

"A.—Yellow, with brown, black edged cross-bands; black bars between the cross-bands on the sides of the belly (*P. ornata*, Gray).

B.—Anterior third of body with a black dorsal stripe; further back, a series of transverse dorsal rhombs on the back, and black spots on the sides and belly. (Var. *maculata*, Jan).

C.—Dorsal region black; sides and belly yellow, with a lateral series of black spots, which may be partly confluent into a stripe; tail with dorsal and lateral spots.

D.—Dorsal region black, ventral region brown, the two separated by a yellow lateral stripe; tail spotted as in the preceding.<sup>1</sup>

E.—Black above, sides and belly yellow; tail spotted as in the preceding (*H. bicolor*, Schn.).

F.—Yellow, with a black vertebral stripe, broken up into spots posteriorly; no lateral spots on the body or tail.

G.—Yellow, with a vertebral band and spots on the tail pale brown or olive."

*Habitat*.—The tropical area of the Pacific Ocean, and connected waters. In Asia the litoral from the Persian Gulf to Yezo (N. Japan). In Africa the East Coast

<sup>1</sup> A modified form of this without the yellow lateral stripe occurs. One such is No. 153 in the Colombo Museum.



(including Madagascar) to the Cape. In Australia, as far East as New Zealand. In America the Western Coast (Mexico, Ecuador, Panama).

## ASTROTIA.

### ASTROTIA STOKESI (Gray).

*Hydrus major*, Shaw, *Zool.*, 1802, iii, p. 558, in part.

„ *stokesii*, Gray, *Stokes Discov. Austral.*, 1846, p. 502, pl. iii, and *Cat.*, 1849, p. 58.

*Hydrophis annulatus*, Gray, *Cat.*, 1849, p. 59.

? *Astrotia schizopholis*, Jan, *Icon Gén.*, 1872, 39, pl. iii.

*Hydrophis stokesii*, Günther, *Rept. Brit. Ind.*, 1864, p. 363.

? „ *guttata*, Murray in *Journ. Bomb. Nat. Hist. Soc.*, 1887, p. 34.

„ *ocellata*, Günther, *loc. cit.*, p. 378, and pl. xxv, fig. P.

*Distira stokesii*, Boulgr. in *Blanford, Fauna Brit. Ind. Rept. and Batrach.*, 1890, p. 408, and *Cat. Brit. Mus.*, 1896, iii, p. 288.

„ „ Wall in *Spol. Zeylan.*, August 1907, p. 168.

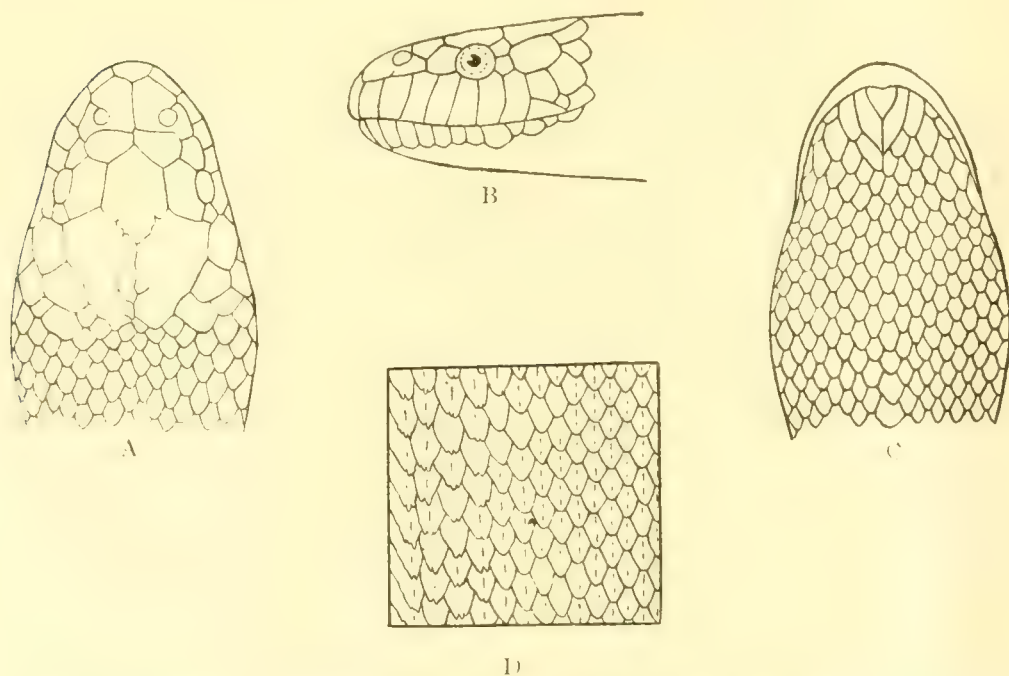


Fig. 65.—*Astrotia (Schizopholis) stokesi*. After Jan, *Icon. Gén.*, 1872, 39, pl. iii.

I have examined seven examples. The species is not only very well differentiated, but possesses ventrals peculiar to itself, and I cannot but think that this alone warrants its separation from the genus *Distira*, where Mr. Boulenger places it. These shields are best considered absent; they are replaced by scales similar to the adjacent costals in that they are strongly imbricate, and serrate or dentate at the margins. They are little broader than the adjacent costal rows, and rather more pointed. There

are from 230 to 267 of these scales in the series. The number of costal rows exceeds that of nearly all the other species of this subfamily, the exceptions being *Hydrus platurus*, *Enhydrina valakadyn* and *Thalassophis annandalei*. The head shields vary much in individuals, and the supralabials are especially prone to division.

*Description*.—The neck is more than half the extreme body depth.

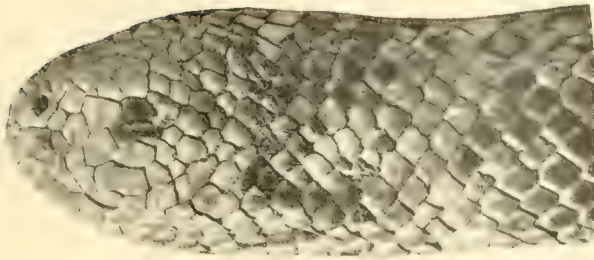
*Rostral*,—touches four shields; the portion visible above is about half the suture between the nasals. *Præfrontals*,—usually touch the second labial only (sometimes the third also, rarely none). *Postoculars*,—two usually (sometimes three). *Temporals*,—absent, replaced by scales of which there are two or three superposed between the parietals and subjacent labials. *Supralabials*,—eight to eleven, very irregular, the third, fifth and succeeding members of the series frequently divided into an upper and lower part. The fourth is not divided in any of these specimens, but from analogy there is every reason to believe this merely a coincidence. The fourth, fifth and sixth are the usual ones to find contact with the eye. *Infralabials*,—Very irregular, all are prone to division, but the first, second or third may be entire. *Marginals*,—a row succeeds the first, second or third infralabials. *Sublinguals*,—absent, replaced by small scales. Here from analogy I would expect to see specimens in which the anterior and possibly the posterior of these shields are sufficiently developed to merit the name; this is justified from the condition of these shields in individuals of *viperina*, *cærulescens*, and *ornata*. *Costals*,—anterior 41 to 48, midbody 48 to 59, posterior 41 to 50, strongly imbricate everywhere, the last rows irregularly dentate, marginally and apically emarginate. *Ventrals*,—230 to 267 (Boulenger). Absent, replaced by pairs of scales similar in size and shape to the adjacent costals except they are more pointed. (Anteriorly there are generally a few entire shields similar to those seen in other species).

*Colour*.—Yellowish with black bands, or more frequently bars. Often there is a dorsal and a ventral series of bars in mid and posterior body which alternate costally. The ventral series is sometimes modified into several series of spots of variable size, *H. guttata* (Murray). A dorsal line occurs between the bars or bands usually.

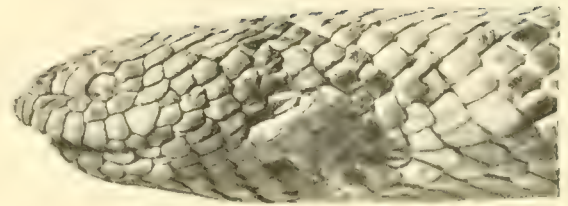
Ranges between the Mekran Coast and Australia, but appears to be decidedly rare everywhere.



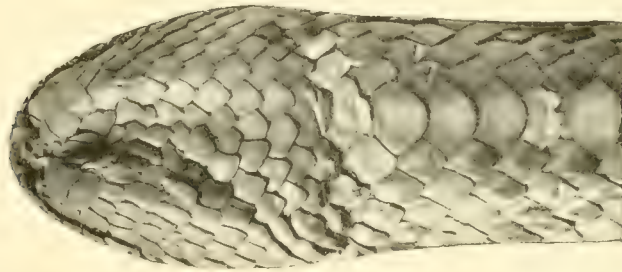




A



B



C

Fig. 6

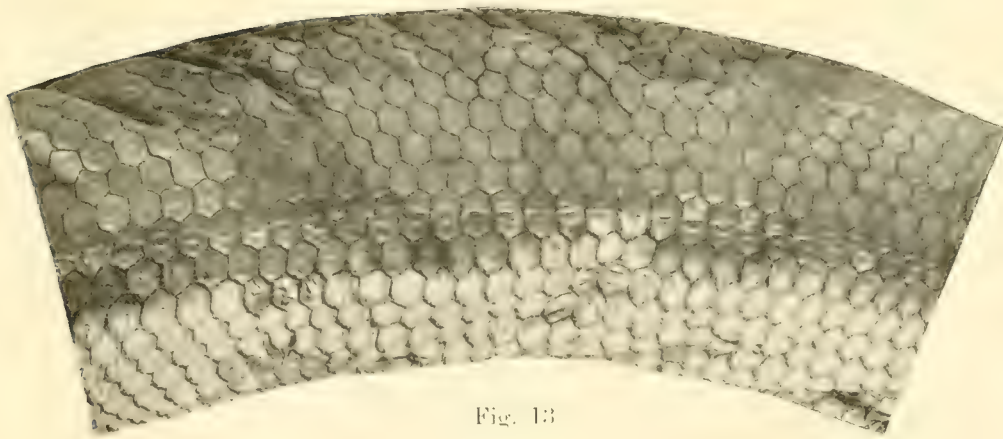


Fig. 13

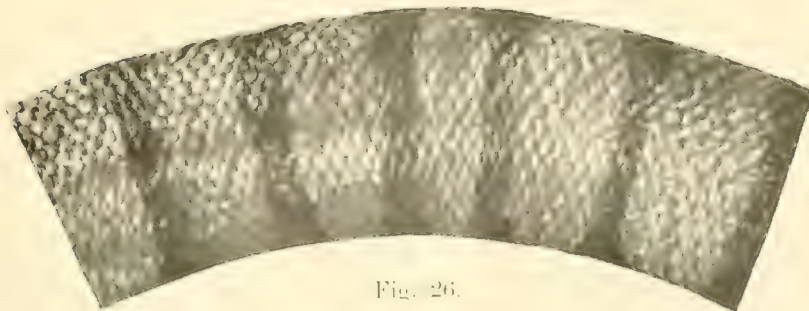


Fig. 26.

Fig. 6. A, B, C, *Aipysurus australis*.

„ 13. *Distira cantoris* to show median furrow in posterior ventrals.

„ 26. „ *spiralis*, var forma typica.





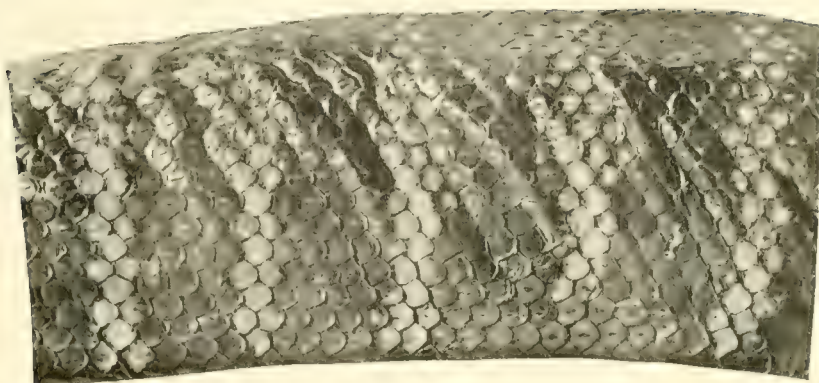


Fig. 27

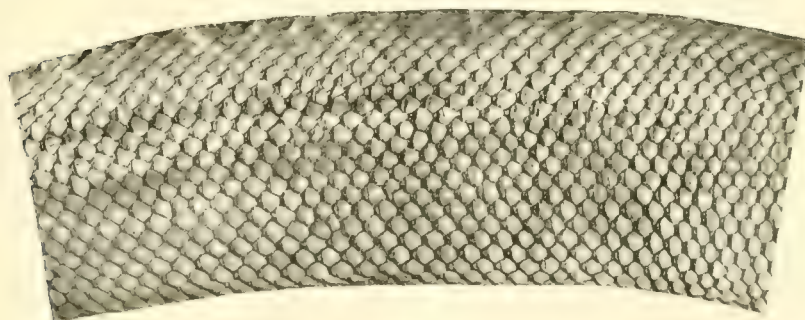


Fig. 35.

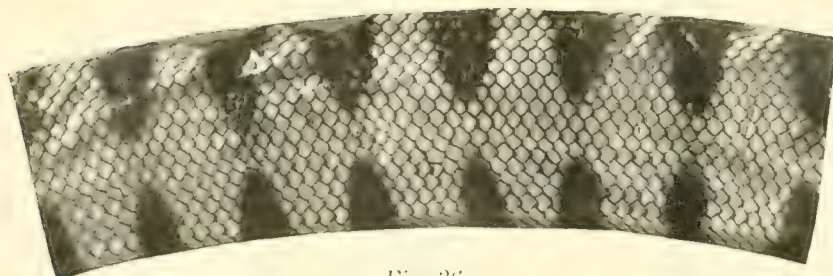


Fig. 36.

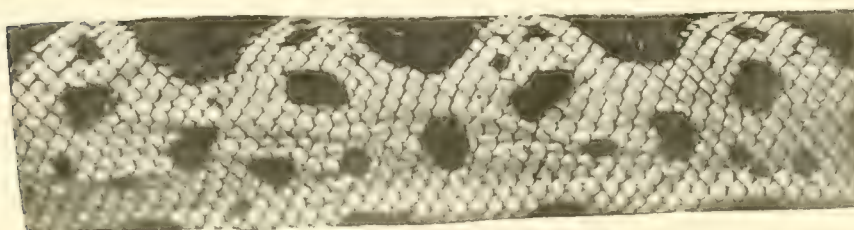


Fig. 37

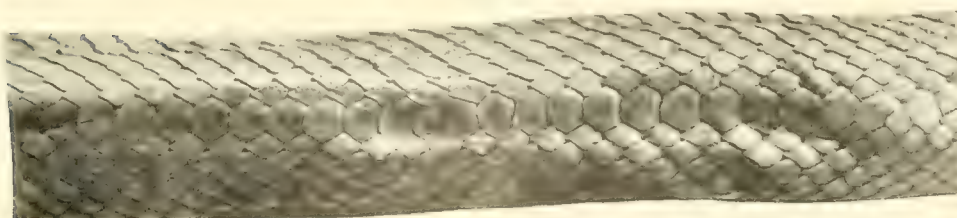
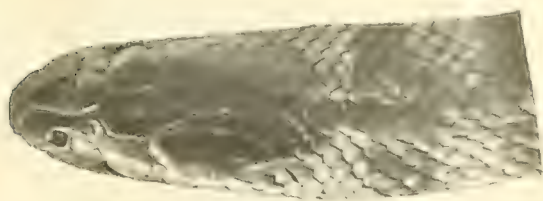


Fig. 38.

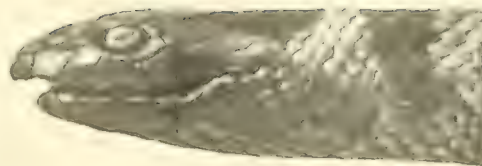
- |          |   |
|----------|---|
| Fig. 27. | <i>Distira spiralis</i> var <i>melanosoma</i> . |
| .. 35.   | .. <i>cyanocincta</i> var <i>phipsoni</i> .     |
| .. 36.   | .. .. <i>macfarlanei</i> .                      |
| .. 37.   | .. .. <i>elegans</i> .                          |
| .. 38.   | .. .. to show ventrals.                         |



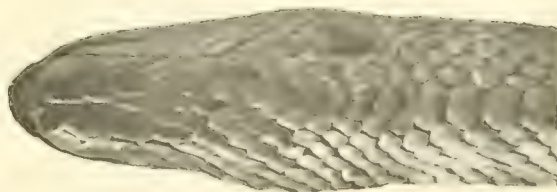




A



B



C

Fig. 41.

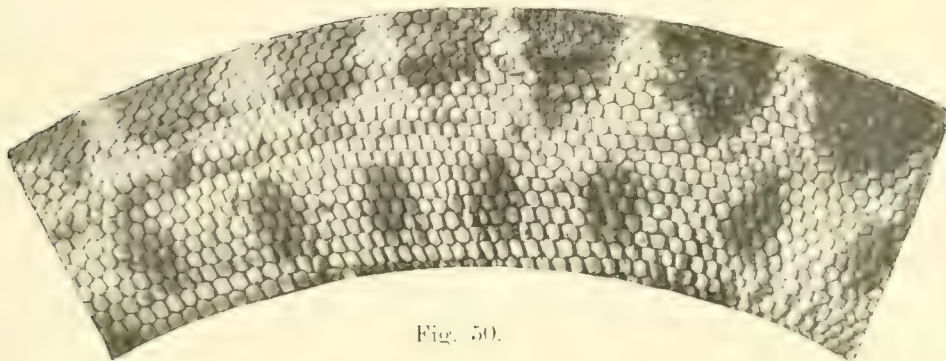


Fig. 50.

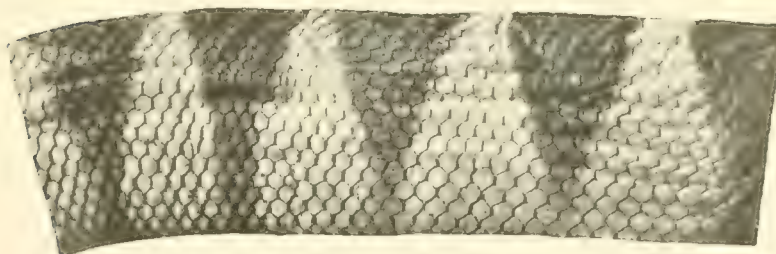


Fig. 51.

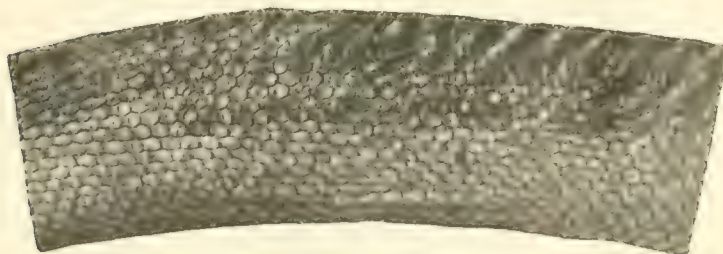


Fig. 52.

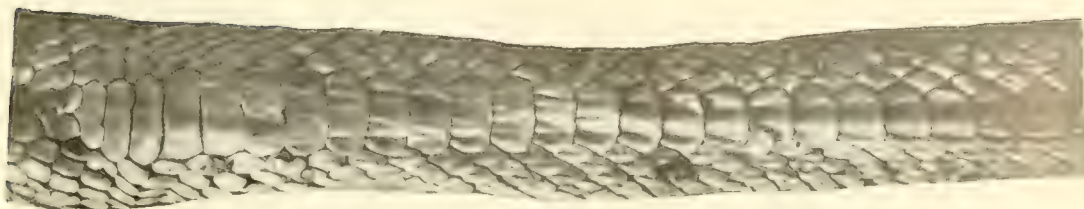


Fig. 57.

Fig. 41. A, B, C, *Distira lapemoides*.,, 50. *Distira ornata* var 4, from Jerdon's specimen in the British Museum.

,, 51. ,, ,, 1, from the Loo Choo Islands in the British Museum.

,, 52. ,, ,, 5, *Inornata* from the type in the British Museum.,, 57. ,, *viperina*. Showing enlarged anterior ventrals.





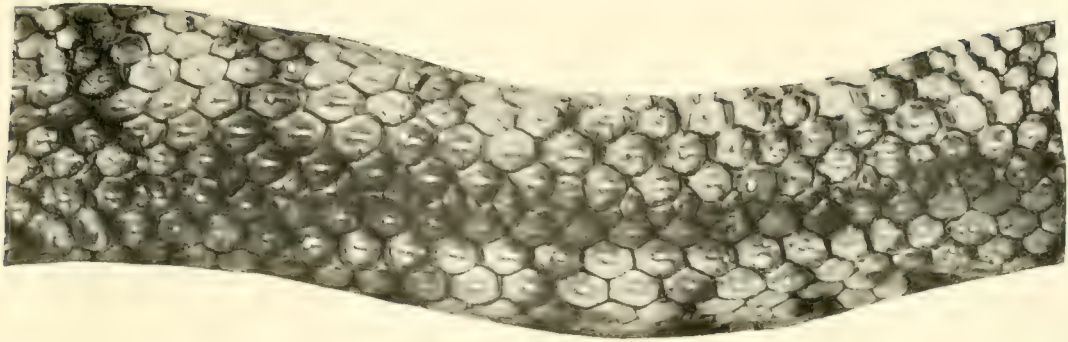
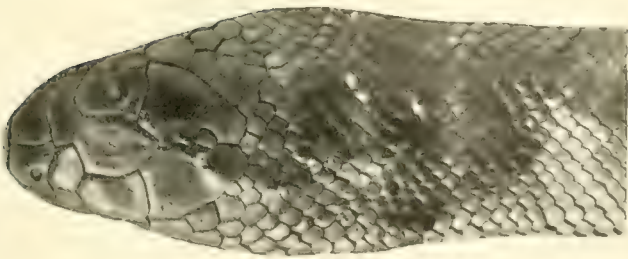


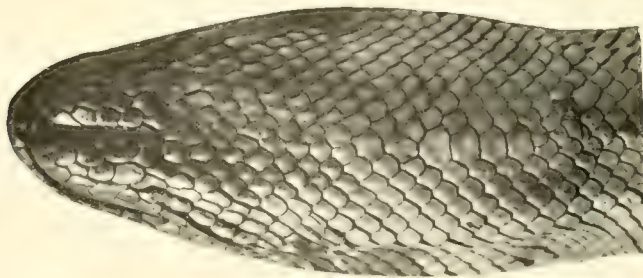
Fig. 63.



A



B



C

Fig. 66

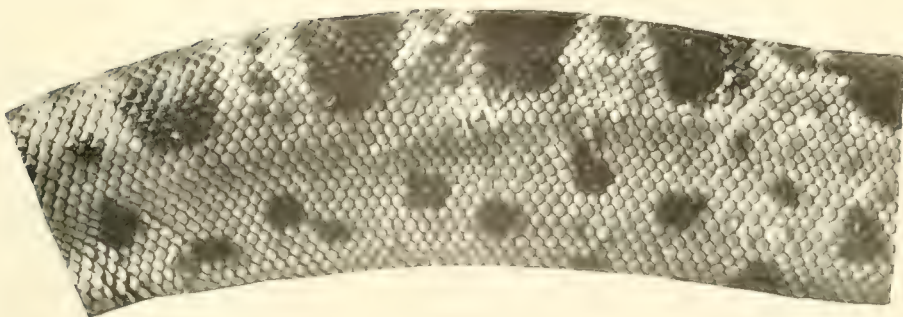


Fig. 67.

Fig. 63. *Enhydris hardwickii*. Showing the ill developed irregular ventrals.

.. 66. A, B, C, *Astrotia stokesi*.

.. 67. *Astrotia stokesi*.





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